Transfer Switch 101

ASCO Power Technologies™

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AUTHORIZED IACET PROVIDER

Life Is On Schneider Electric

Learning Objectives

- Stuff
- What is a transfer switch?
- Code and standards
- Major Functions of a transfer switch
- Types of transfer switches
- What's New
- What's Coming
- Cummins Series X

What is a Transfer Switch?

An automatic transfer switch is an integral component of an emergency power supply system (EPSS).

- The transfer switch allows **safe switching from utility power to standby power** while maintaining isolation of each source from the other.
- The main goal is to provide electrical power to the facility loads (during a power outage) from the standby generator without back feeding that can damage utility equipment and hurt (or kill) utility workers.
- **Automatic transfer switches safeguard data and telecommunication networks**, industrial processes and critical installations such as health care facilities and financial transaction centers.

Why are Transfer Switch Ratings so Important UL1008

Continuous Current Rating

- Must Carry Current 24 Hrs./Day
- In Both Normal or Emergency Positions
- 7 Days/Week for 20 to 40 Years
- No Overheating of Contacts
- Withstand and Close-in on High Fault Currents

Market Drivers

Codes and Regulations

Code/Standard	Description	Relevance to ATS Purchasing
The Joint Commission	Primary organization for accrediting healthcare facility compliance with codes and regulations	In many states, Joint Commission accreditation required to obtain operating licenses.
Centers for Medicaid and Medicare Services	Requires accreditation/compliance with codes and regulations	Government Healthcare reimbursements contingent upon facility compliance with codes and regulations
Commission on Accreditation for Law Enforcement Agencies	Prescribes backup power standards for regulated public facilities	Compliance required for emergency service facilities, 911 call centers, etc.

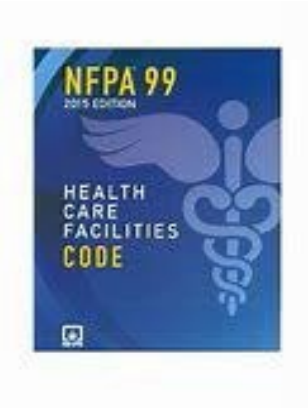
Codes and Regulations

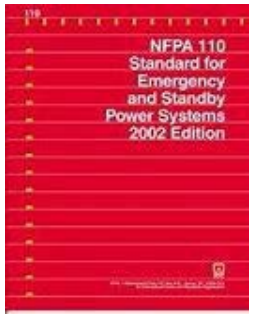
Codes and Regulations

Code/Standard	Description	Relevance to ATS Purchasing
UL 1008 – Standard for Safety	Product safety testing requirements for transfer switches	UL-Listed ATS required for NEC® compliance
National Electrical Code®	Equipment installation standards	NEC compliance required to satisfy electrical inspections by local authorities
NFPA 110 Standard for Emergency and Standby Power Systems	Standards for backup power systems at facilities with regulated life safety systems	Drives periodic testing and reporting for backup power systems
NFPA 99 Healthcare Facilities	Standards for backup power systems in hospitals, surgery centers, and outpatient facilities	Drives backup power system design

Compliance with Transfer Switch Codes and Standards

- NFPA 70 – National Electric Code
  - Article 700 – Emergency Systems – **Automatic Transfer Switch**
  - Article 701 – Legally Required Standby Systems – **Automatic Transfer Switch**
  - Article 702 – Optional Standby Systems – **Manual or Automatic Transfer Switch**
  - Article 708 – Critical Operations Power Systems (COPS) – **Automatic Transfer Switch**
  - Article 517 – Health Care Facilities
- NFPA 99 – Health Care Facilities
- NFPA 110 – Emergency & Standby Systems
- **UL 1008 – Transfer Switch Equipment**





Transfer Switch Definition & Types: UL Directive

UL 1008 Safety Standard for Transfer Switch Equipment

An "Automatic transfer switch" as covered by these requirements is a device that automatically transfers a common load from a normal supply to an alternate supply in the event of failure of the normal supply, and automatically returns the load to the normal supply when the normal supply is restored.

A "Non-automatic transfer switch" as covered by these requirements is a device, operated manually by a physical action, or electrically by remote control, for transferring a common load between a normal and alternate supply.

Transfer Switch vs Circuit Breakers

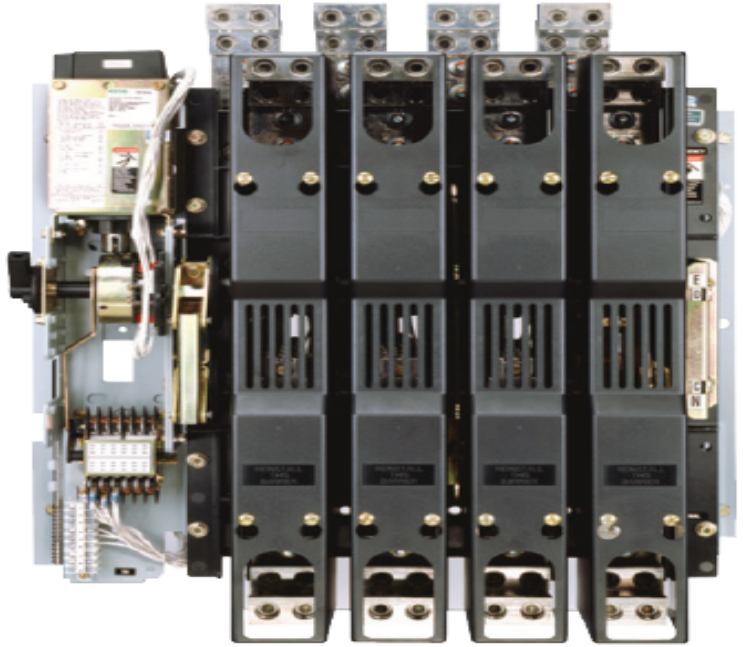
Transfer Switches & Circuit Breakers

An automatic transfer switch connects a critical load to an alternate power source when the normal power source is not acceptable. It must be able to withstand & close-on short circuit currents (WCR).

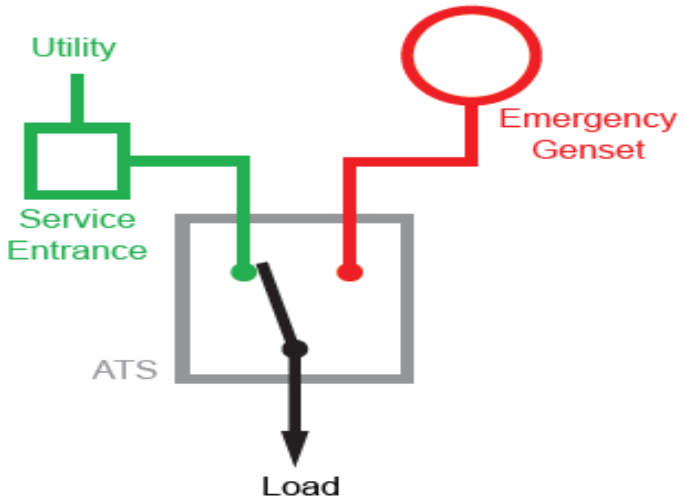
A circuit breaker's function is to disconnect the circuit and the load from the power source under overcurrent conditions. It must be capable of interrupting or breaking short circuit currents (AIC)

Major Functions of an Automatic Transfer Switch

Transfer switches are installed in power distribution systems between power sources and electrical loads. Transfer switches safely switch loads between two isolated sources of power.



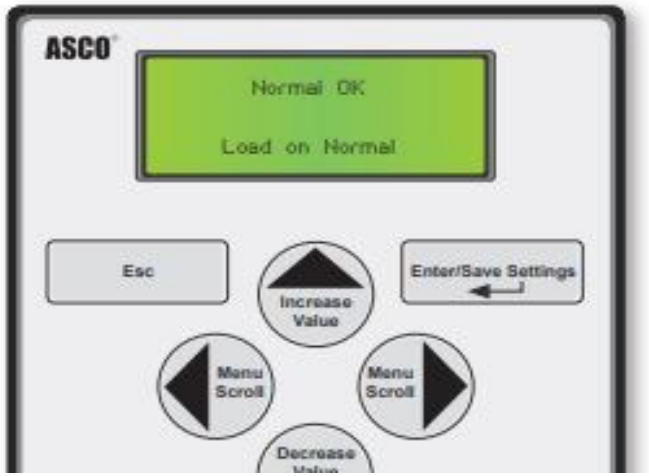
4-Pole Transfer Switching Mechanism



Automatic transfer switches provide the following essential functions without human intervention:

- Carry rated current continuously
- Detect power failure on primary source
- Start alternate power source
- Transfer load
- Sense restoration of power to primary power source
- Re-transfer load to primary source

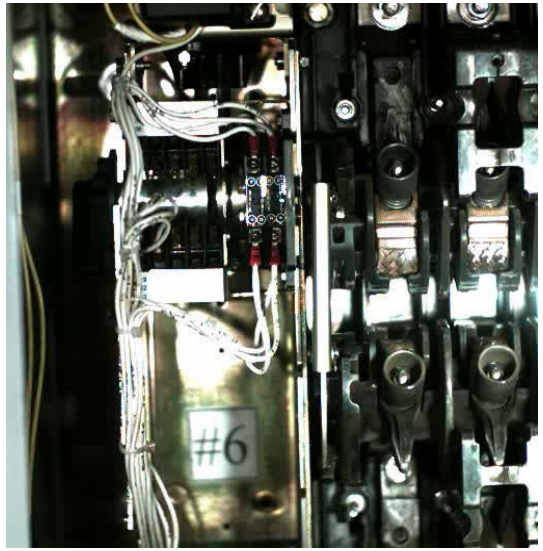
Transfer Switch Components



Controller

- Monitoring
- Time Delays
- Annunciation
- Transfer Control

Switching Mechanism



Solenoid

Automatic Transfer Switch Components

Enclosure

Available in a range of UL-rated types, rugged enclosures protect equipment and ensure promote reliability for a variety of indoor and outdoor environments.

Communications and Metering

From simple indicators to remote annunciators, from real-time monitoring and control to interfacing building automation systems, communication features increase usability and power availability.

Transfer Mechanism

Electrically operated and mechanically held, solenoid-powered operating mechanisms reliably transfer load quickly for even the most demanding applications.

Controller

Electronic controller stores operating criteria, senses electrical conditions, executes transfer sequences, and stores operational data.

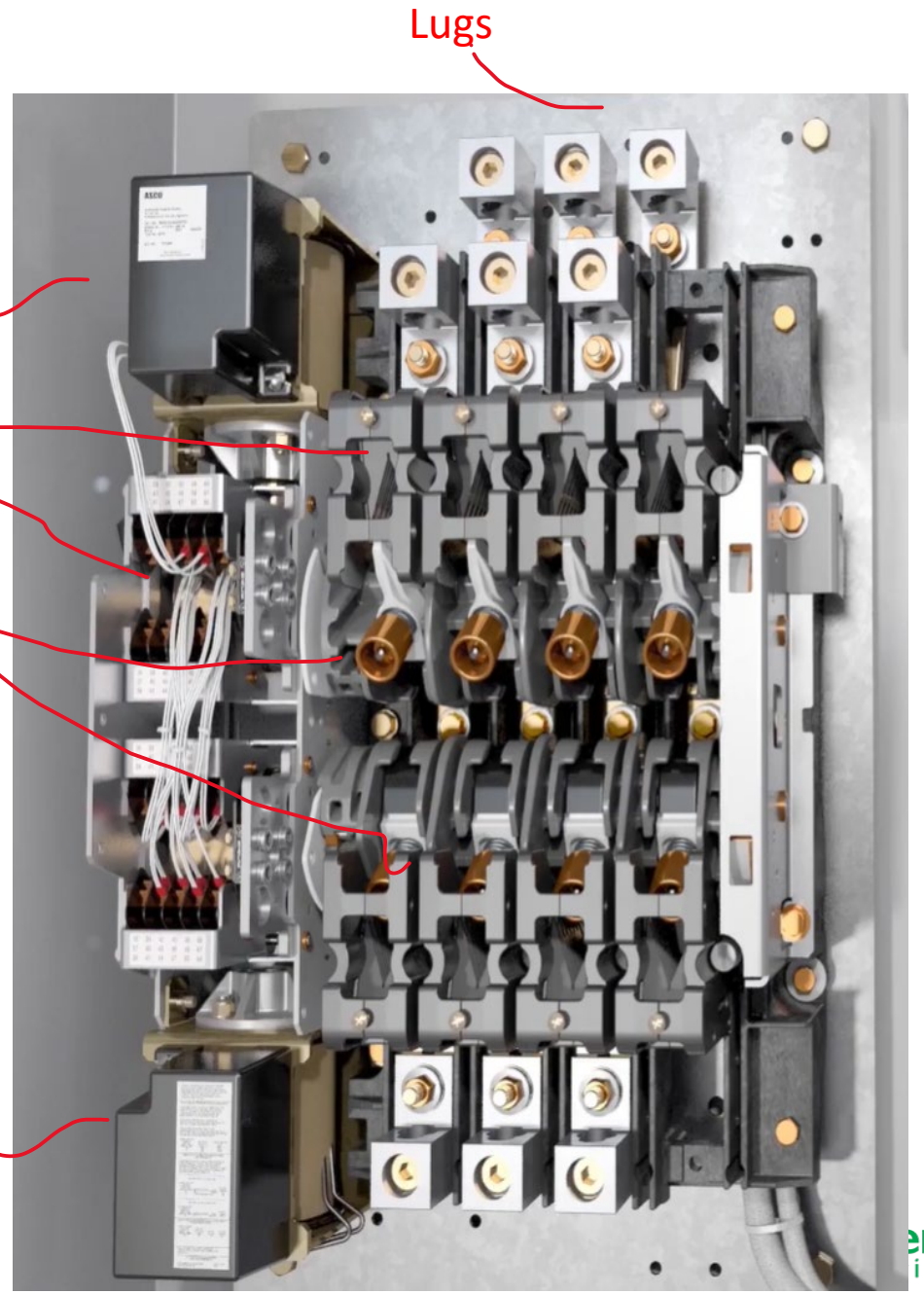
Transfer switch models differ by type of operation:

Transfer Switch Components

The heart of a transfer switch is its transfer mechanism.

It contains the electrical contacts that switch the load between sources

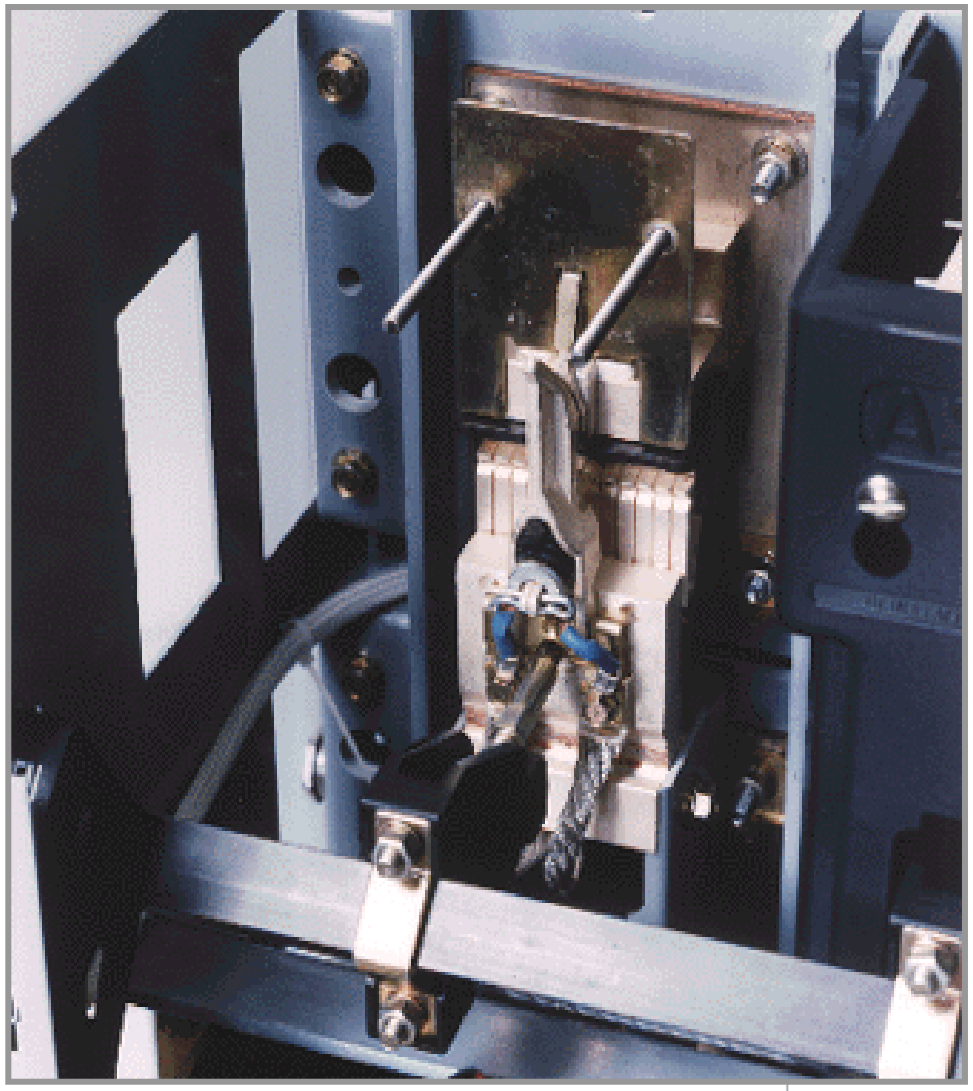
- 150 through 4000 amps
- Utilizes reliable, field-proven solenoid operating mechanisms
- Mechanical interlocks to prevent direct connection of both sources



Transfer Switch Design Criteria

Designing Quality & Reliable Transfer Switches

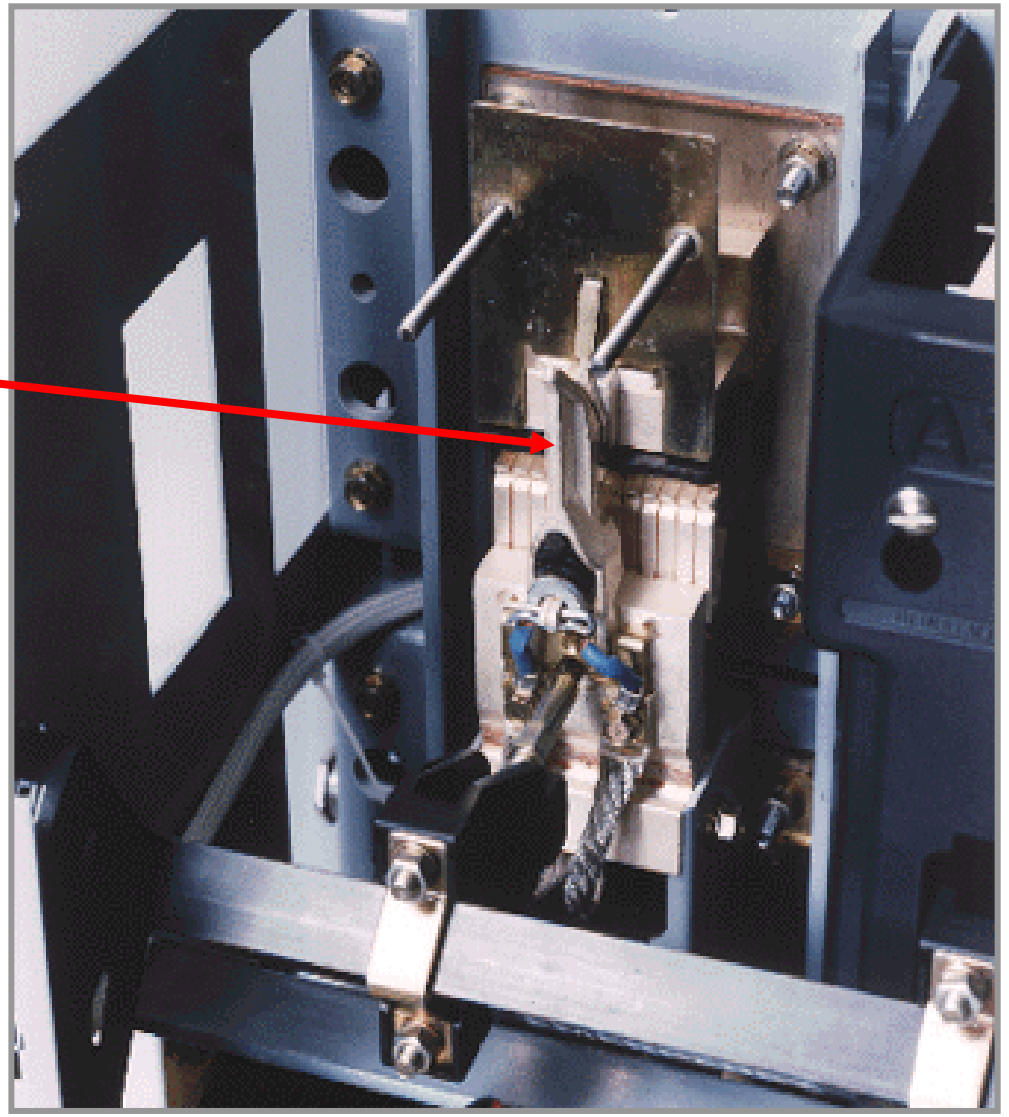
- Designed for Transfer Applications Between Two Live Sources
- Main Contact Structure & Material Design



Transfer Switch Design Criteria

Transfer Switch Contact Considerations

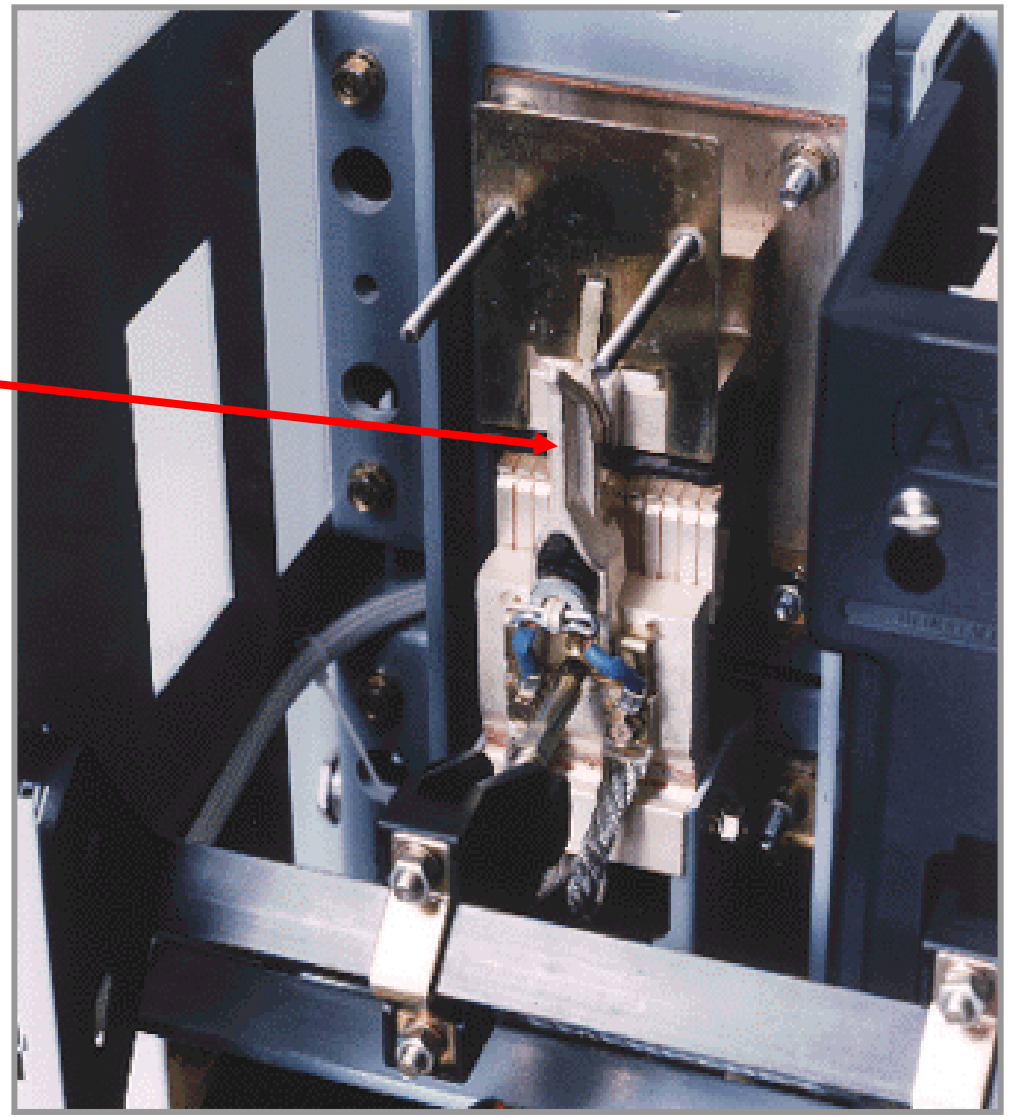
- Arcing Contacts



Transfer Switch Design Criteria

Transfer Switch Contact Considerations

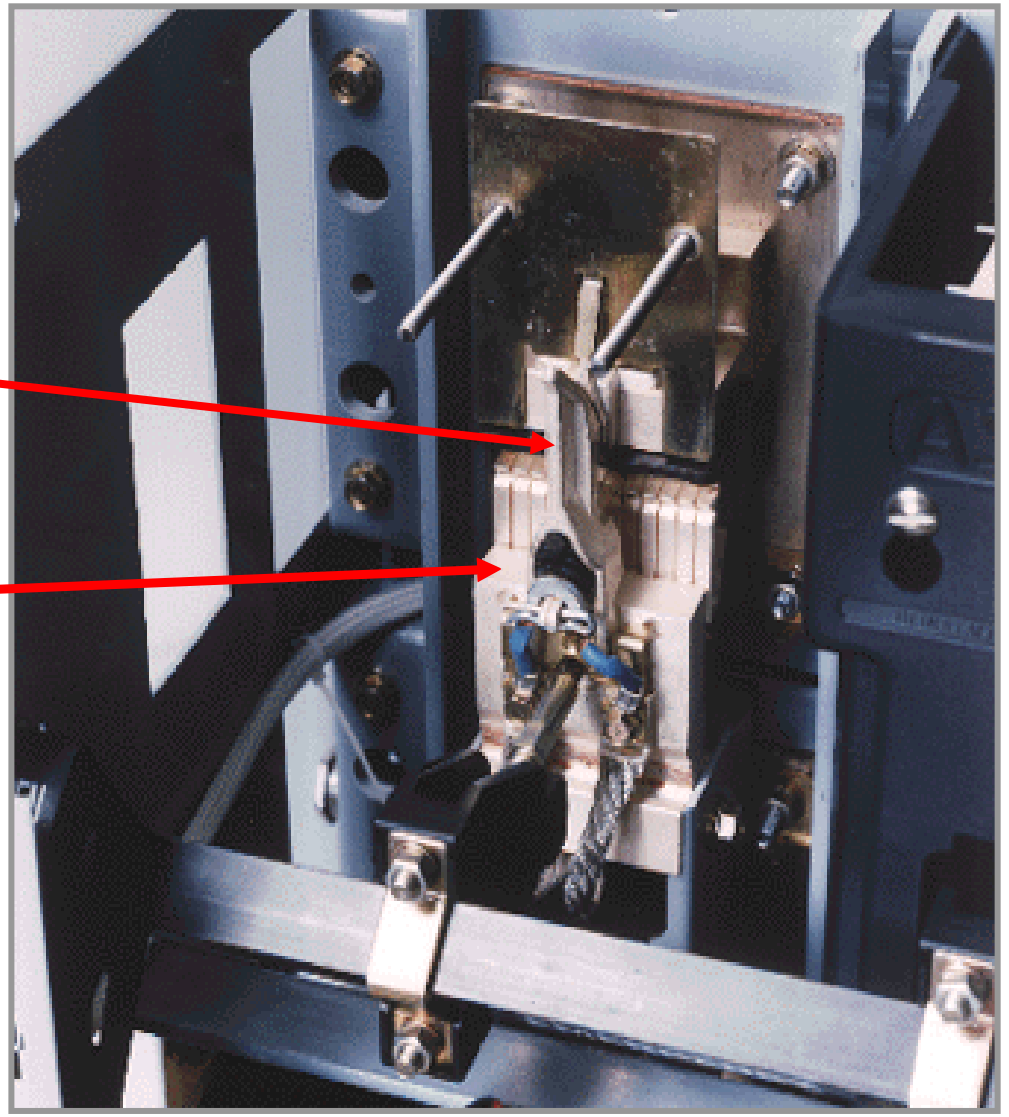
- Arcing Contacts
  - Carry and extinguished arcing
  - Harder material (more tungsten) to sustain heat from arcing and minimize contact erosion



Transfer Switch Design Criteria

Transfer Switch Contact Considerations

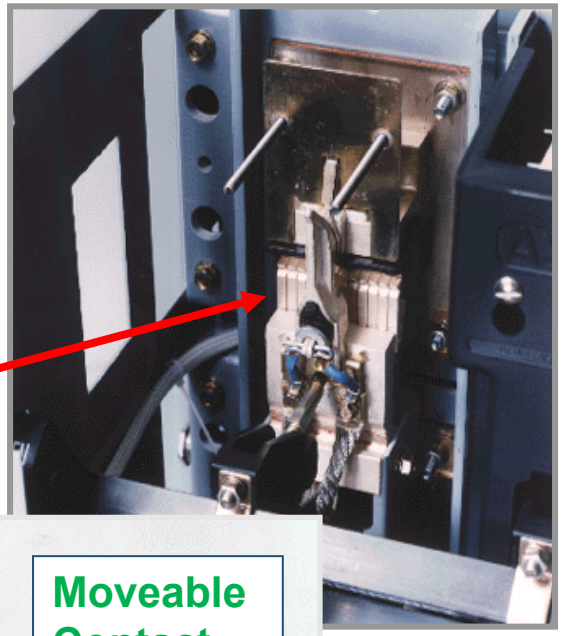
- Arcing Contacts
  - Carry and extinguished arcing
  - Harder material (more tungsten) to sustain heat from arcing and minimize contact erosion
- Main Contacts
  - Carry current without over heating
  - Low resistance, soft material (more silver)

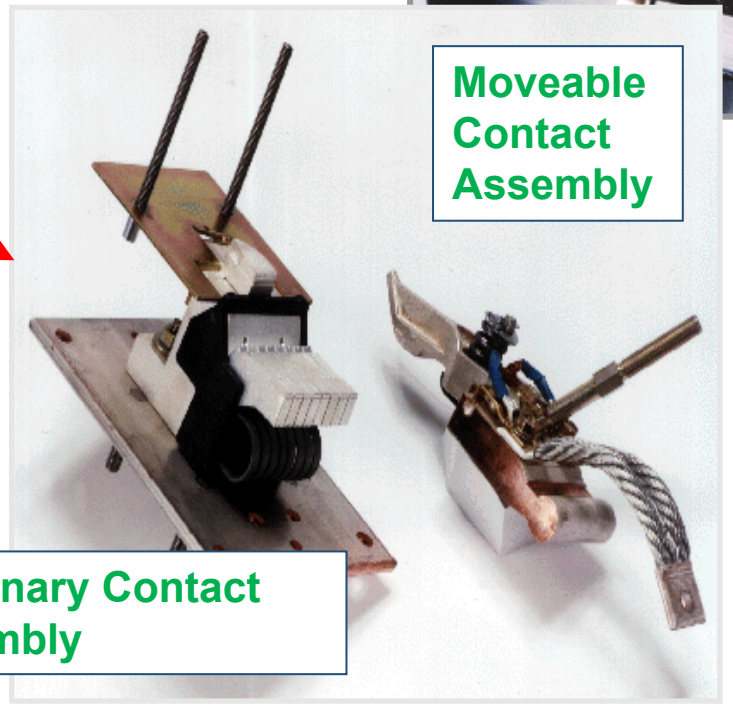


Transfer Switch Design Criteria

Contact Design

- Designed for Transfer Switch Applications
- Arcing Contact Material
- Main Contact Materials
- **Easy to Inspect and Maintain**

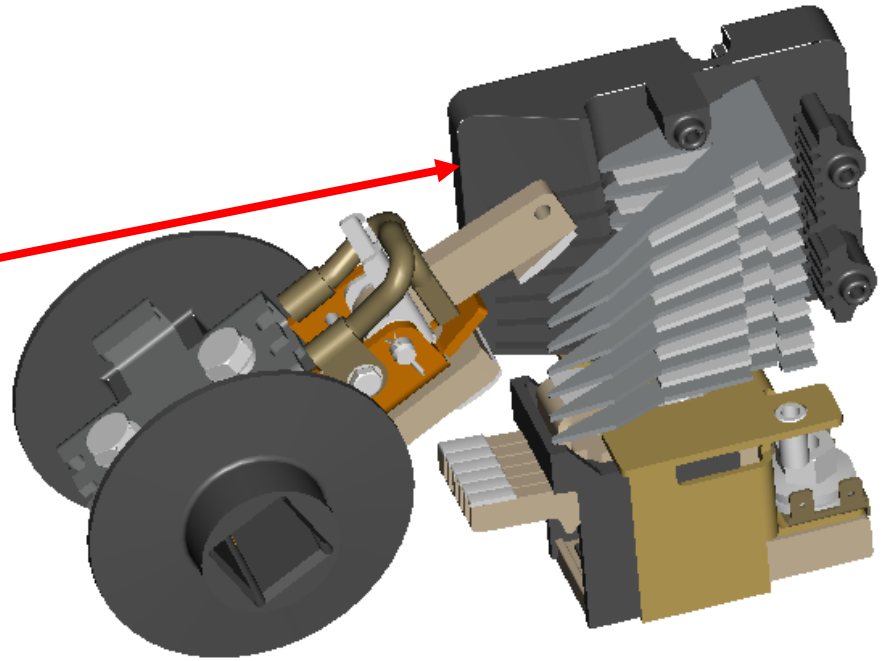




Transfer Switch Design Criteria

Designing Quality & Reliable Transfer Switches

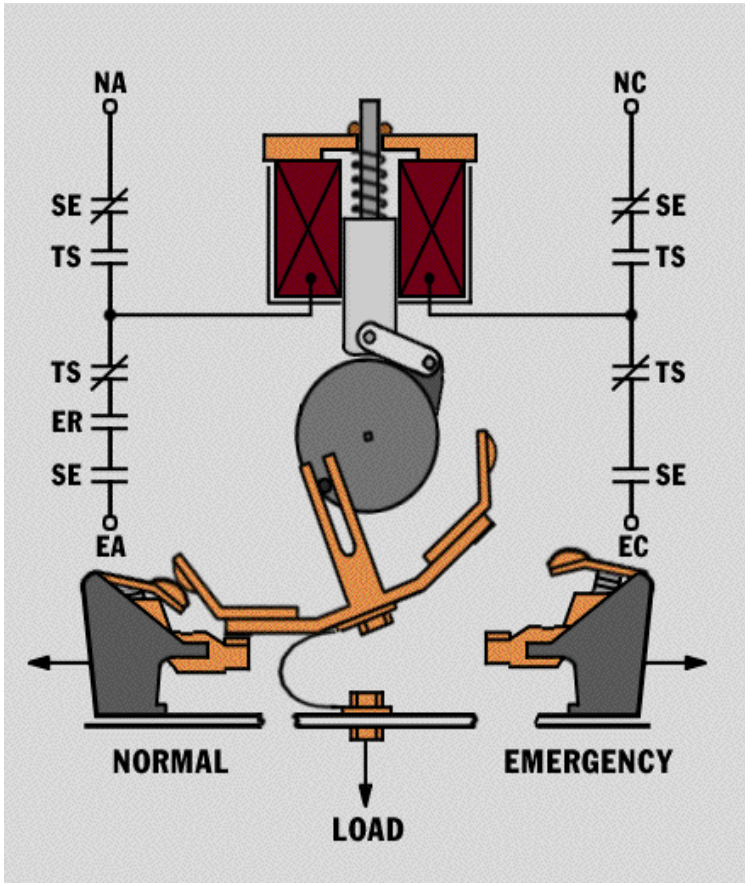
- Designed for Transfer Applications Between Two Live Sources
- Main Contact Structure & Material Design
- Arc Isolation & Suppression
  - Custom designed to fit the geometry of the arcing contacts

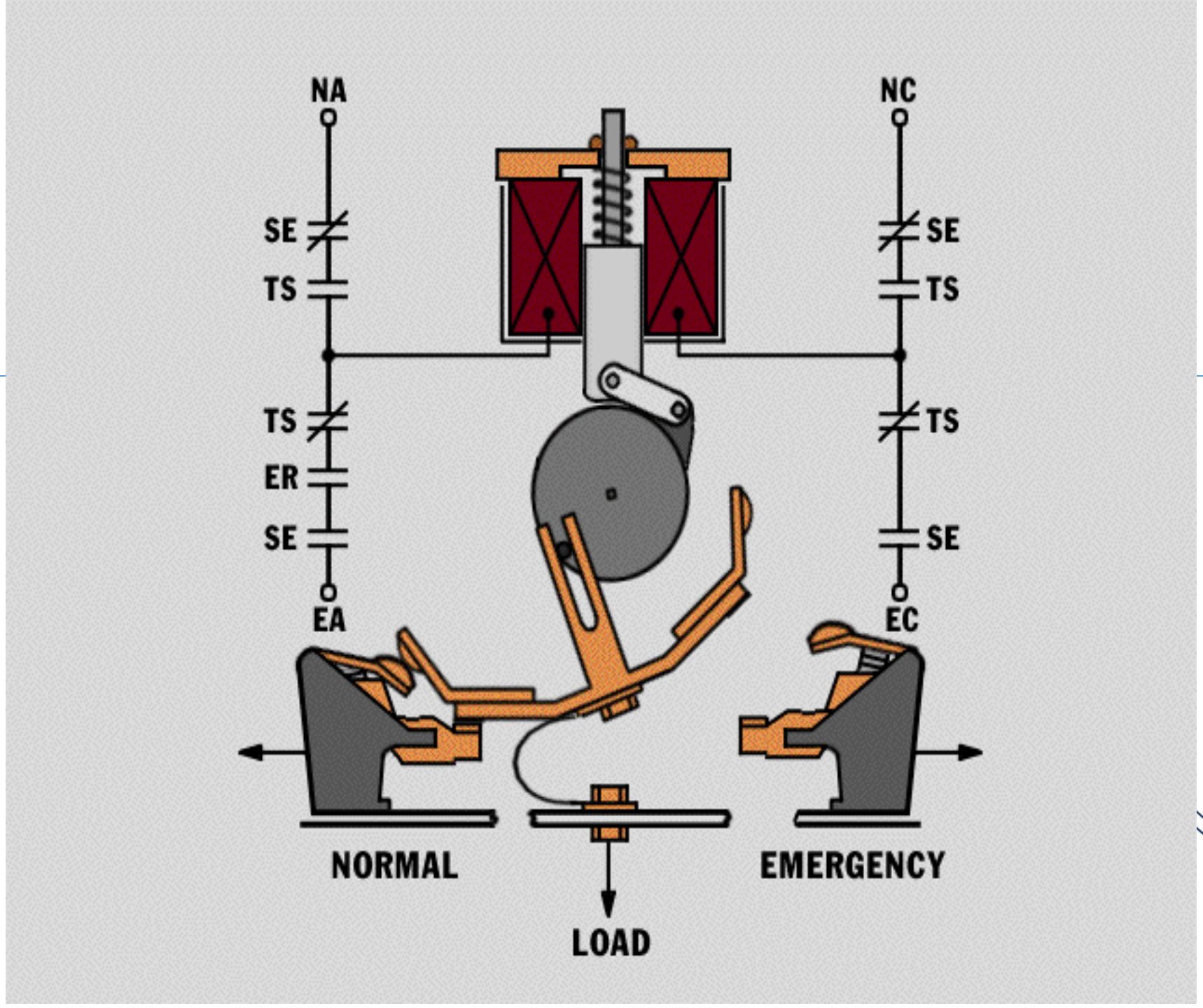


Transfer Switch Design Criteria

Designing Quality & Reliable Transfer Switches

- Designed for Transfer Applications Between Two Live Sources
- Main Contact Structure & Material Design
- Arc Isolation & Suppression
- TS Operating Mechanism
  - Simple & reliable
  - Field proven operation

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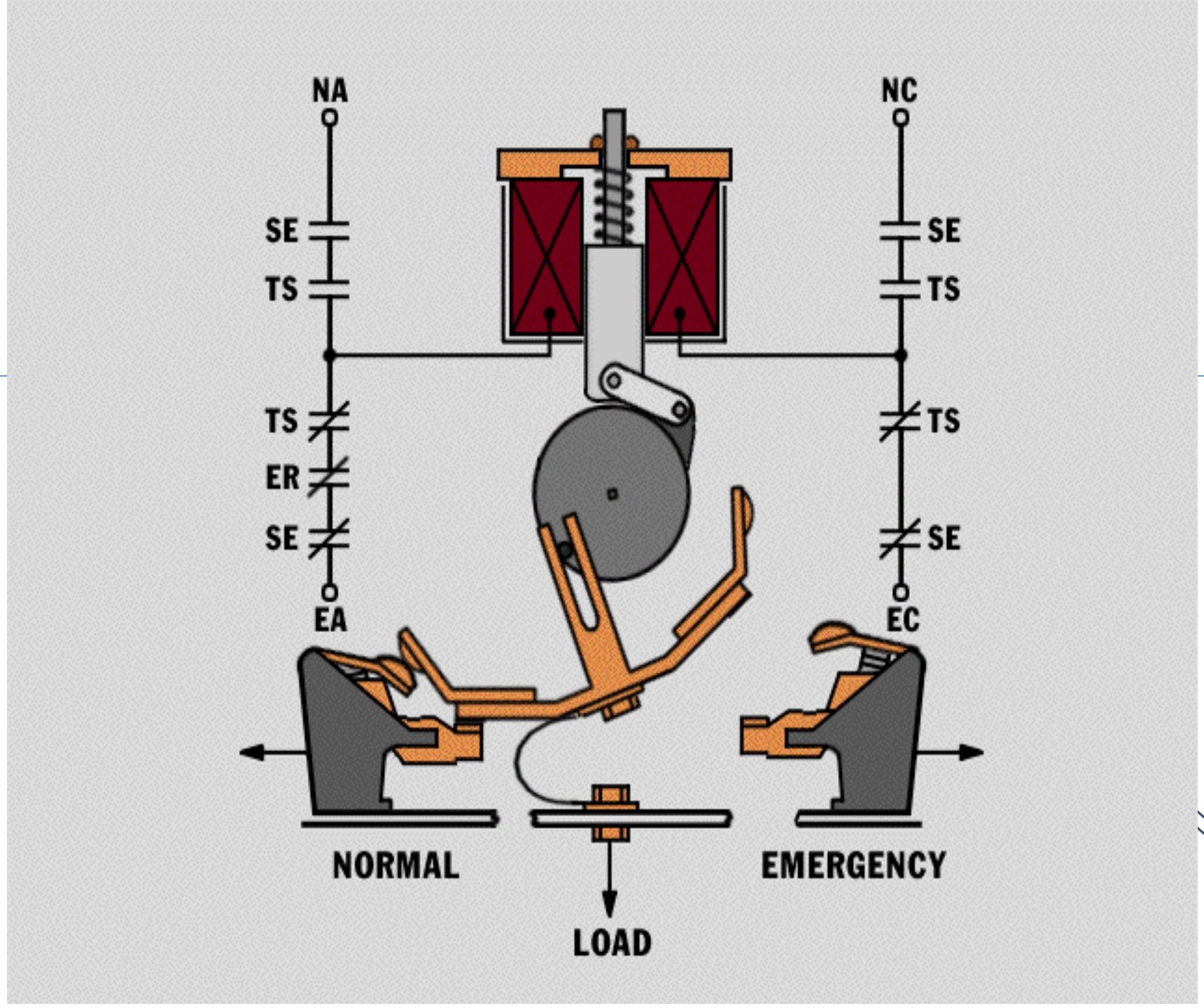
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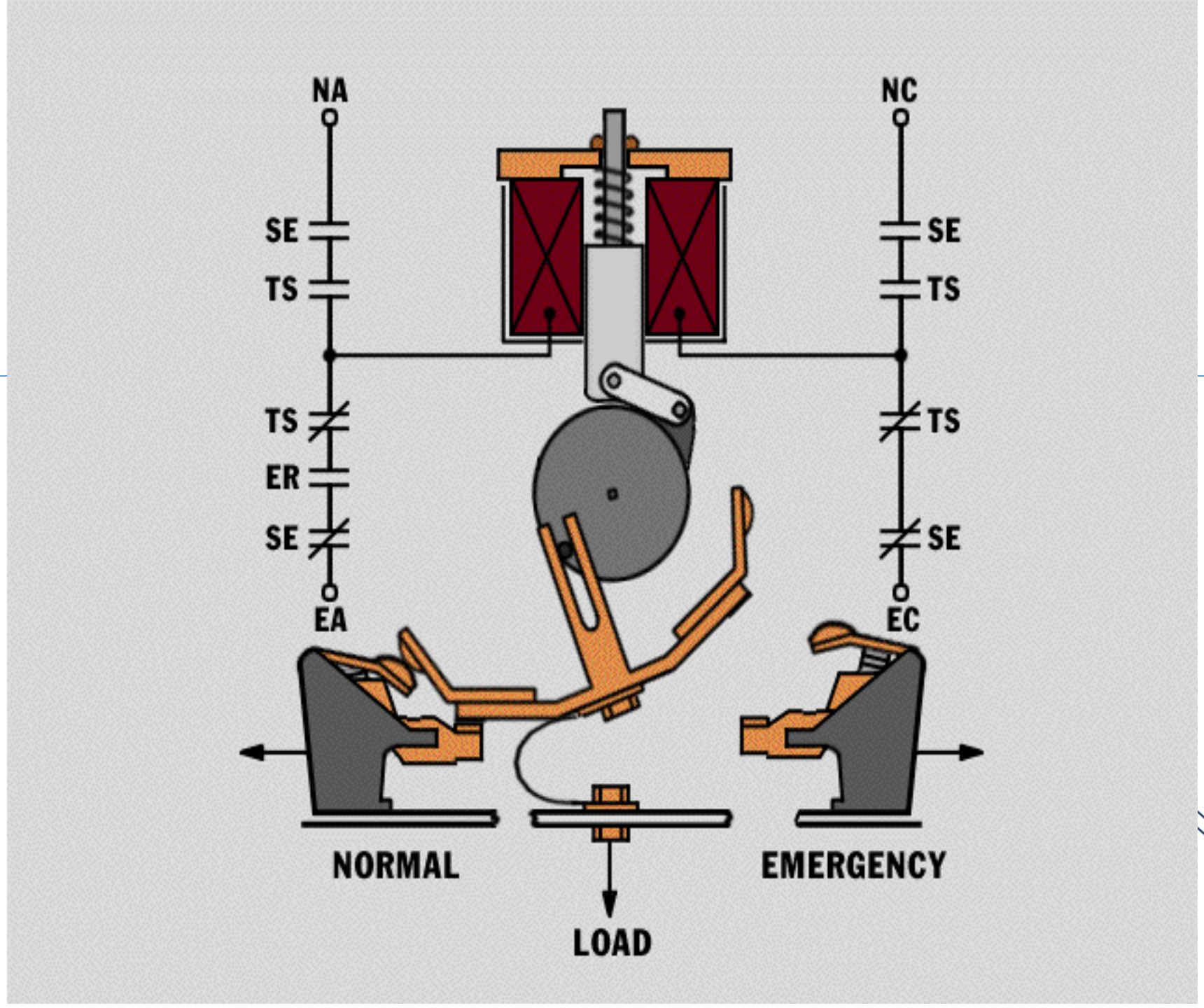
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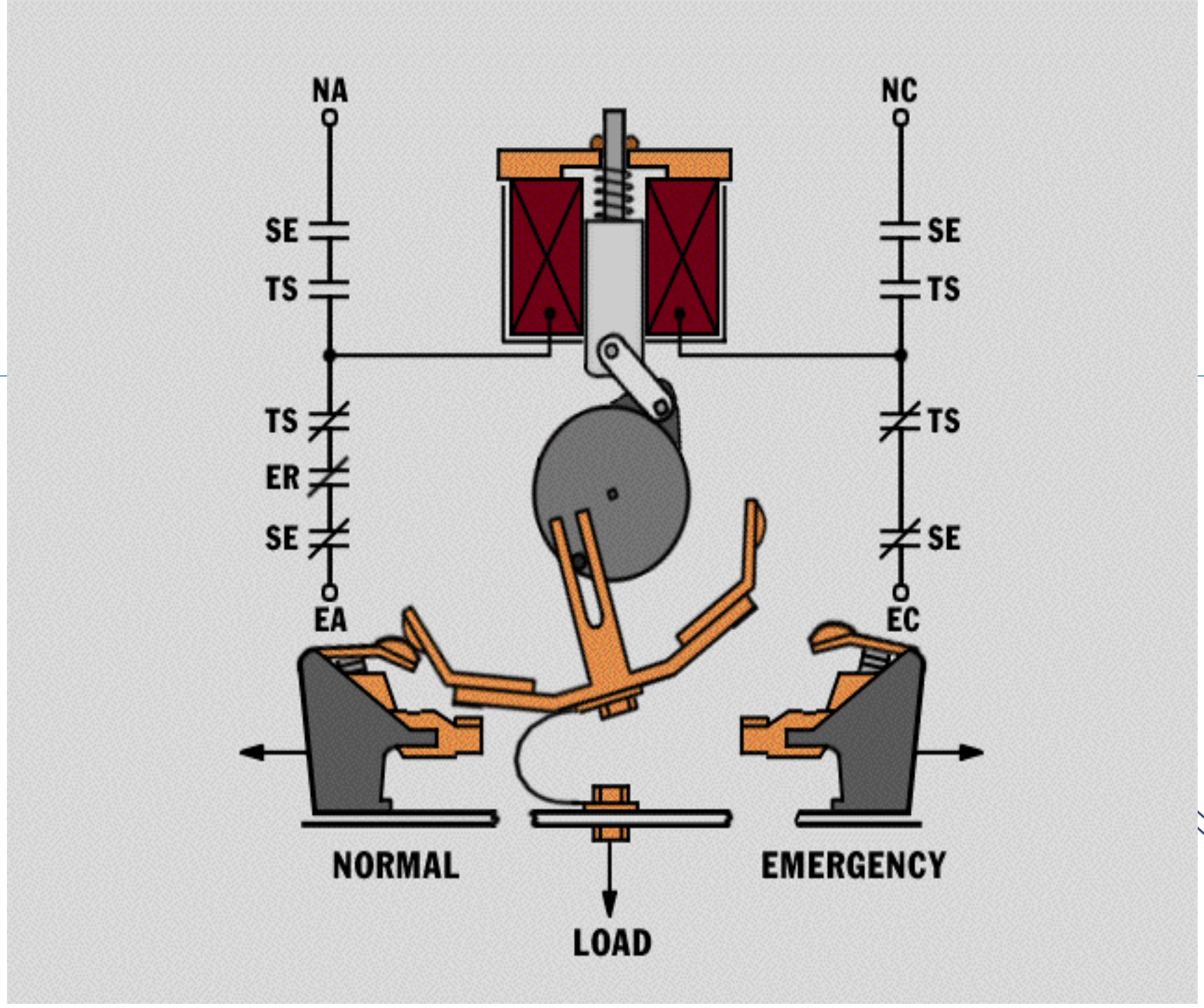
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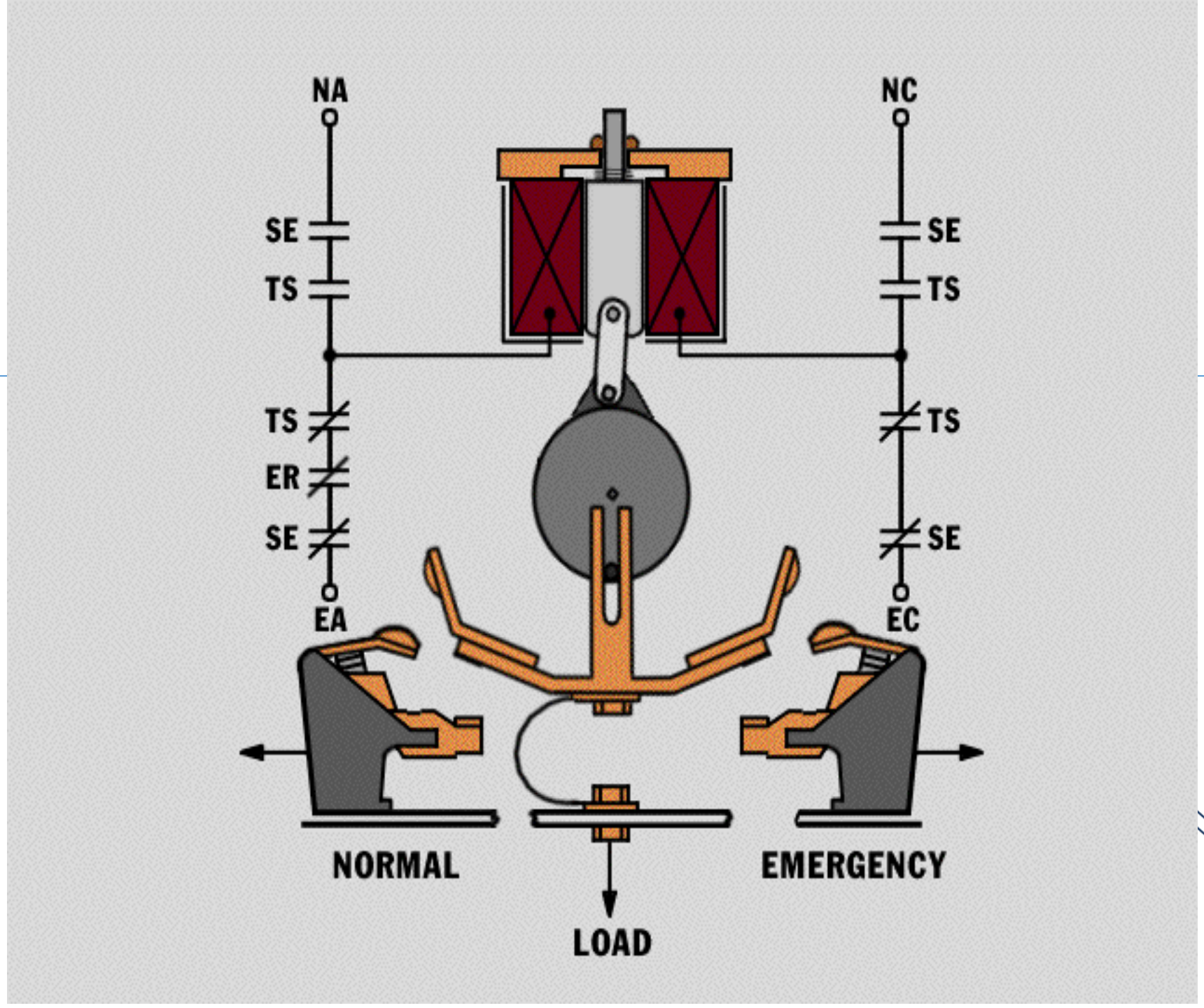
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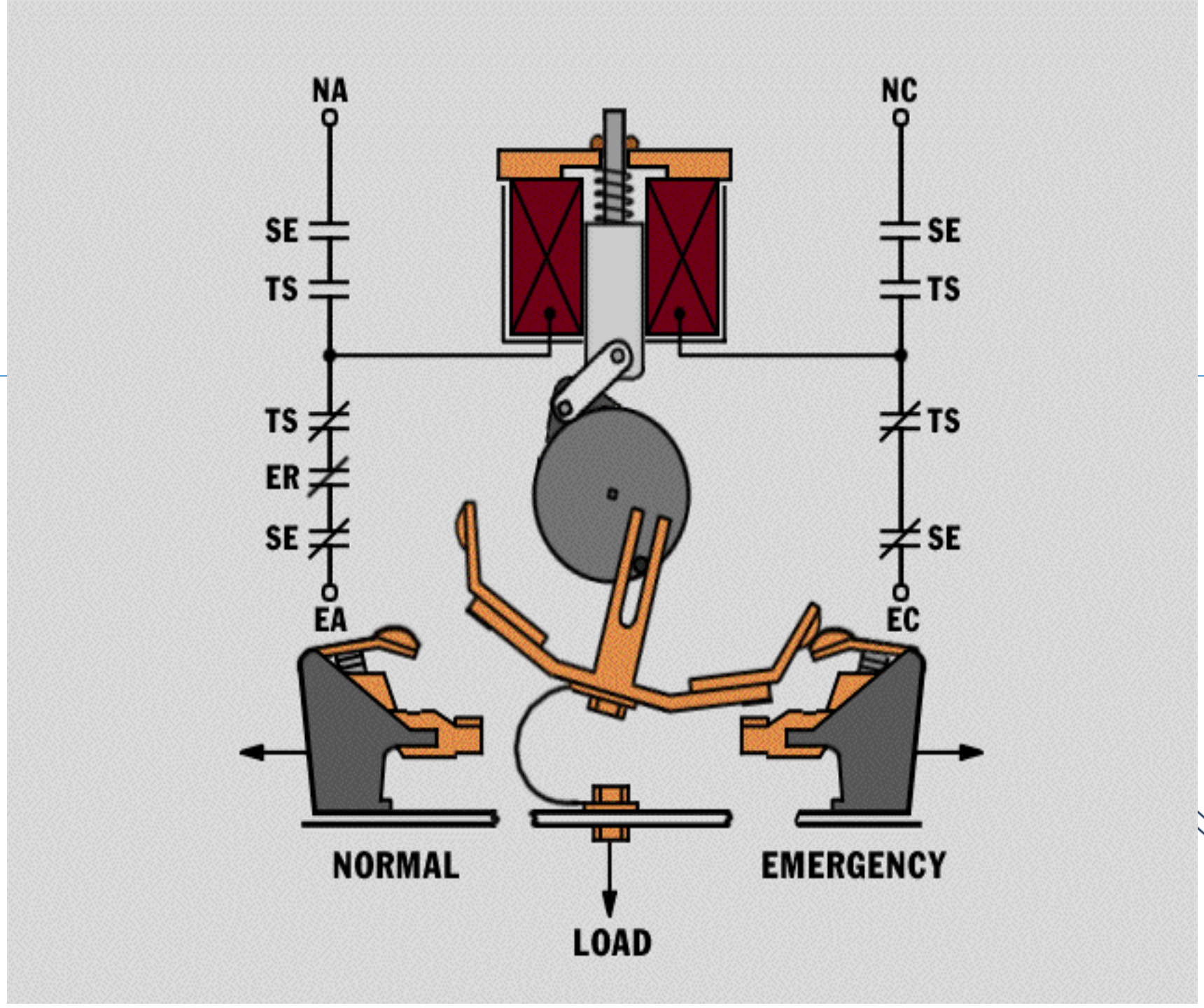
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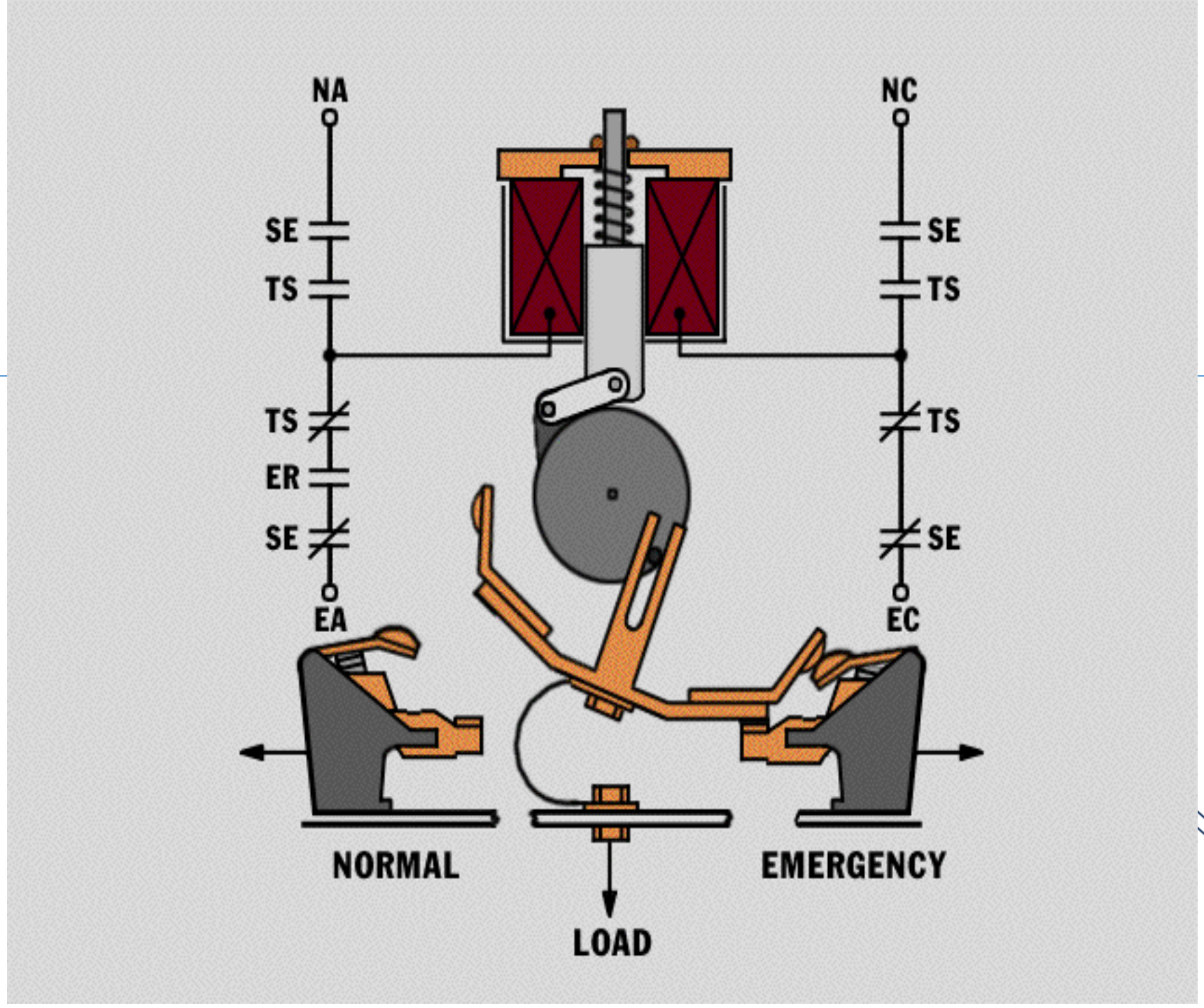
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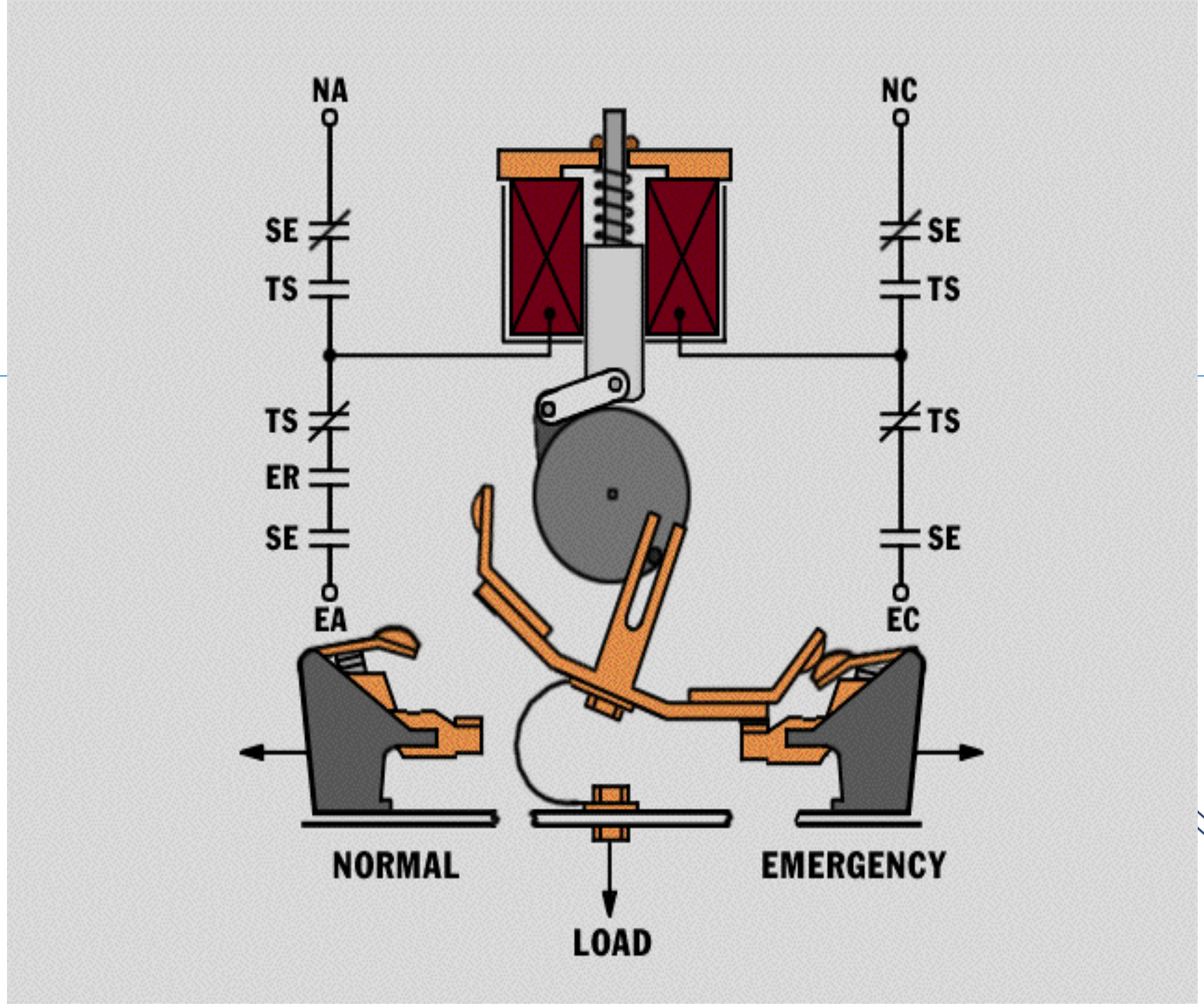
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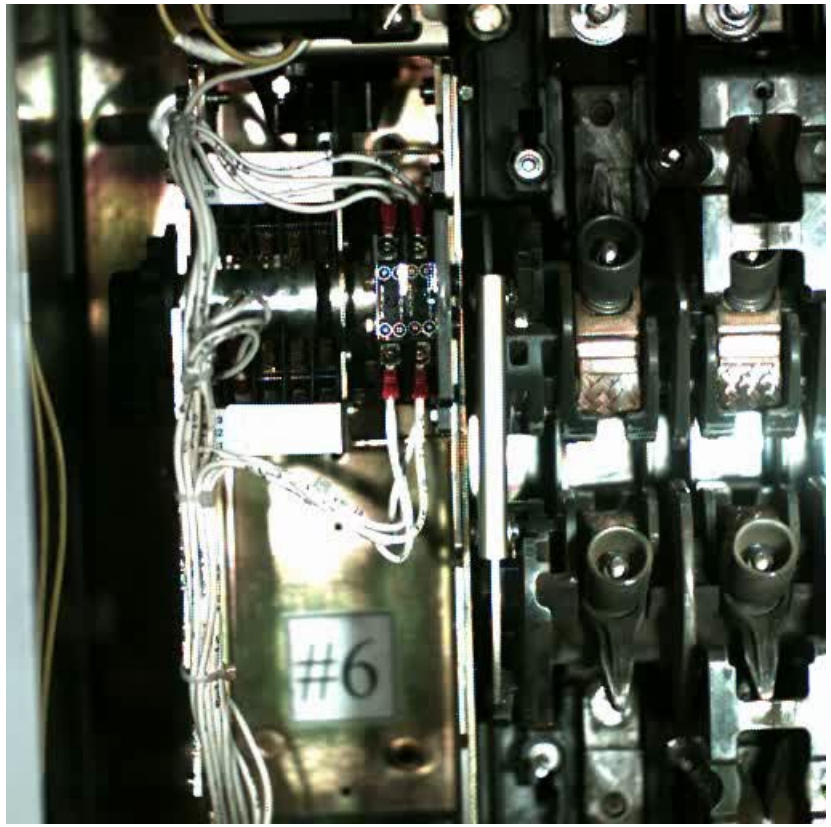
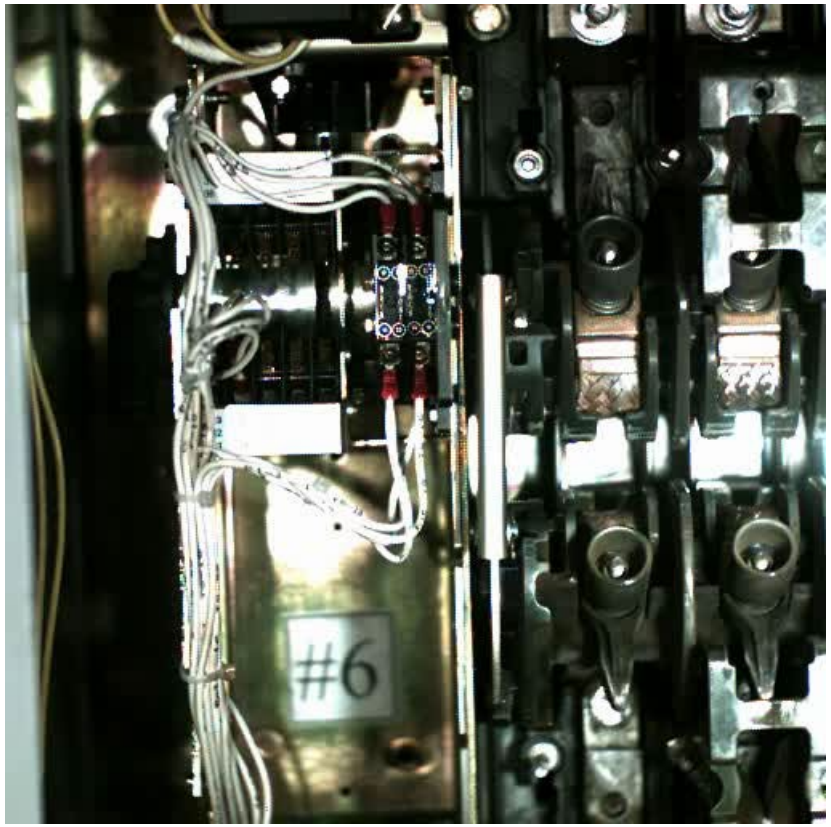
Transfer Switch 600A J Frame Operation

Normal Speed



Slow Motion



Transfer Switch Types ATS, NTS & MTS

Transfer switch models differ by type of operation:

Automatic

Automatic models switch loads to emergency power and back again whenever outages occur, without human intervention.

Non-Automatic

Non-Automatic models use operator initiated, local or remote electrical controls to transfer loads on command.

Manual

The simplest type, manual transfer switches require a person to operate a mechanical switching mechanism.

Transfer Switch Types

Transfer switches vary by:

- Type of control
- Load transition mode
- Value-added features

- ATS
- ATS W/ Bypass
- Service Entrance ATS

Transfer Switch Types-Transitions Open Delayed & Closed Transition

Automatic Transfer Switches use differing sequences to optimize switching events according to application.

Transfer Switch Ratings-General

Voltage Ratings:

- Low Voltage - 120 to 600 Volts AC, 250 VDC
- 50 or 60Hz, Also DC
- Medium Voltage Transfer Switches - 5 to 15 KV
- Current Rating: 30-4000 Amp

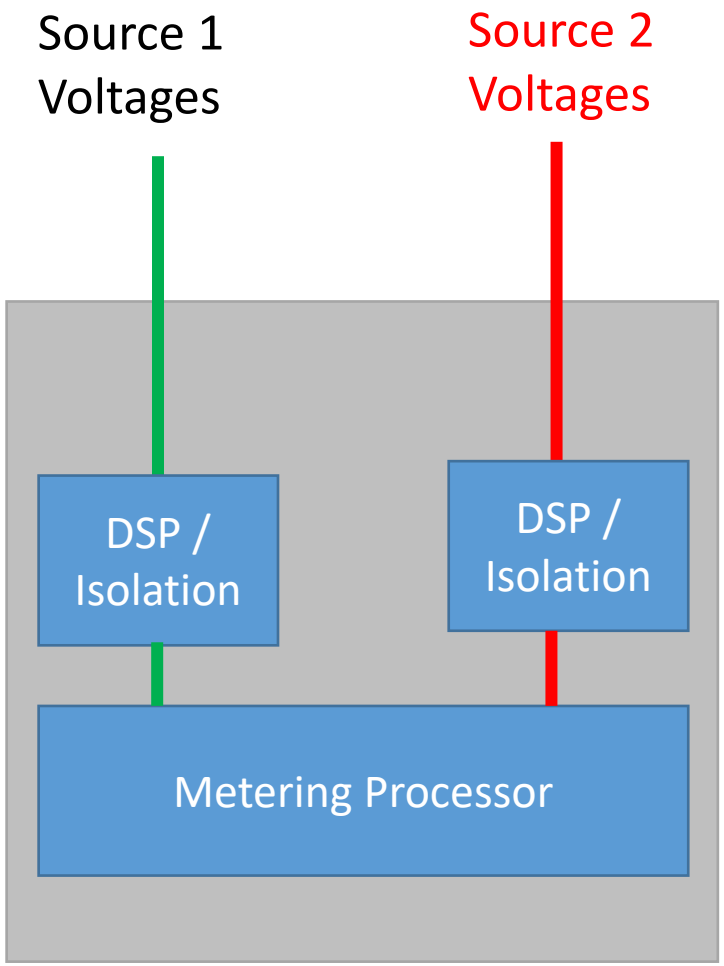
Transfer Switch Ratings

Current Ratings

- Continuous rating Amperes
- Inrush (No need for derating)
- Interrupt / Overload (UL1008 Testing)
- Withstand / Closing Rating (WCR)

Sensing and Measurement

- Core ATS controls are driven based on two parameters.
  - Voltage
  - Frequency
- All other parameters are derived based on these readings.
  - Phase Angle
  - Voltage Unbalance
  - Phase Rotation
- Some systems may add current sensing to allow for more advanced features.
- Although sensing happens at sub cycle levels all information is presented in RMS format.
- Most controllers accept LV range up to 600Vac but can support higher voltages via Potential Transformers. (ex. Medium voltage transfer switches)



Pickups & Dropouts

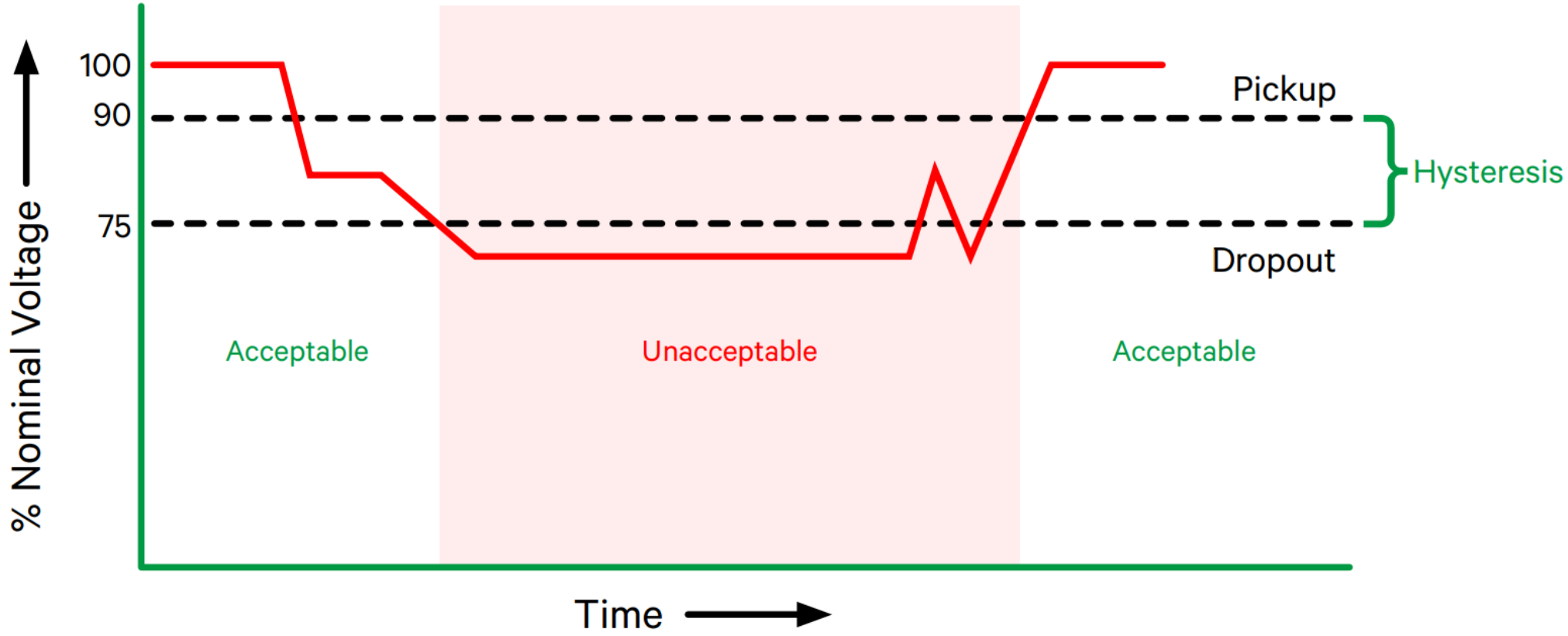
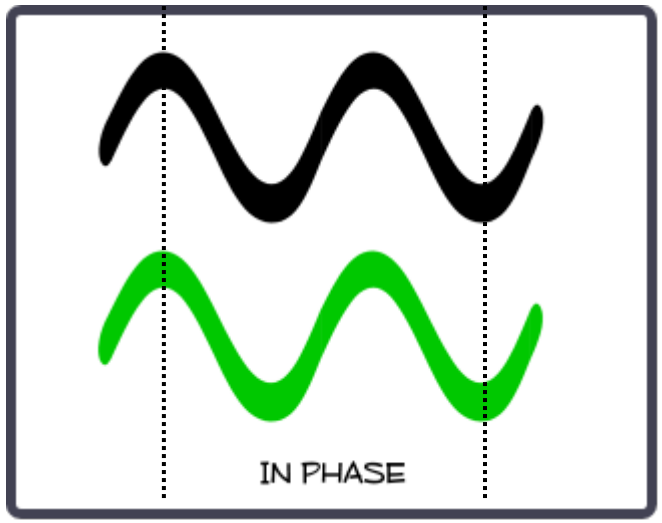
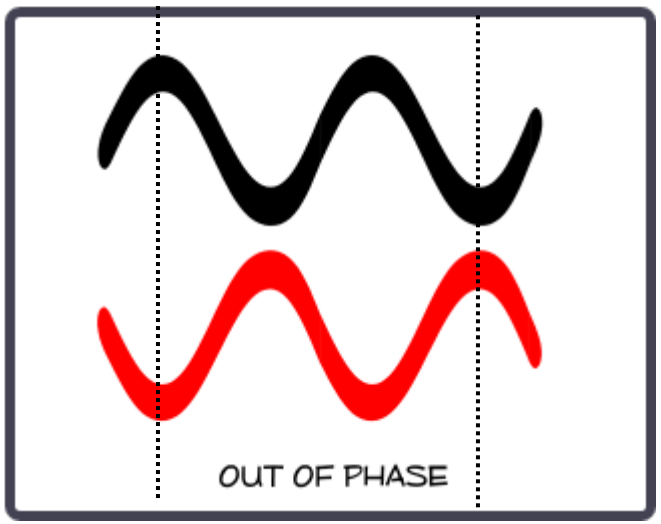


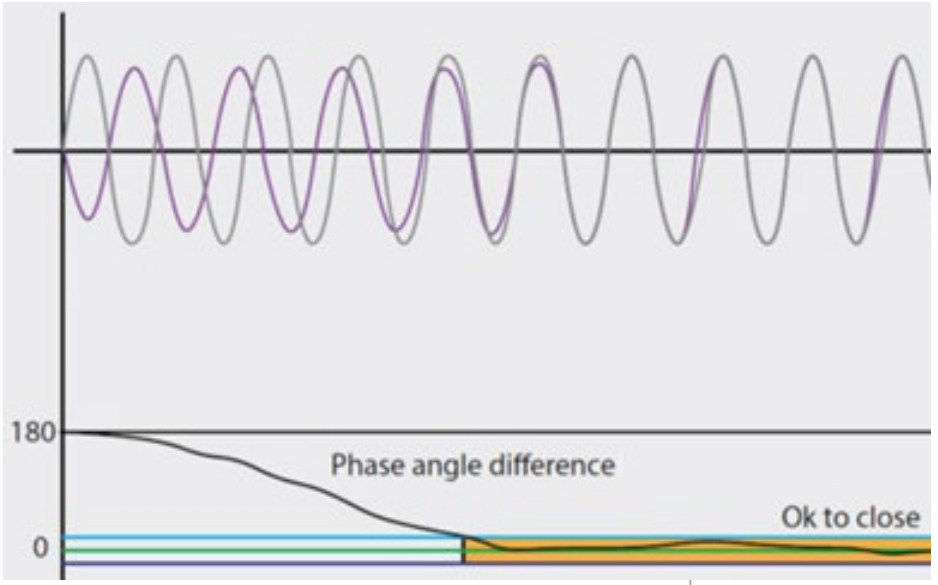
Figure 1: Pickup voltages are typically set higher than dropout voltages to avoid unnecessary cycling of the transfer switch. Voltage is only one parameter considered to assess source acceptability.

In-Phase Transfer

- In-phase transfer passively monitors the phase angle difference between the sources and transfers when they are within a “in-phase” window.
- This adds a variable delay in the transfer sequence while the system waits for in-phase to occur.
- Recommended only for open transition systems due to quick transfer operation requirement.



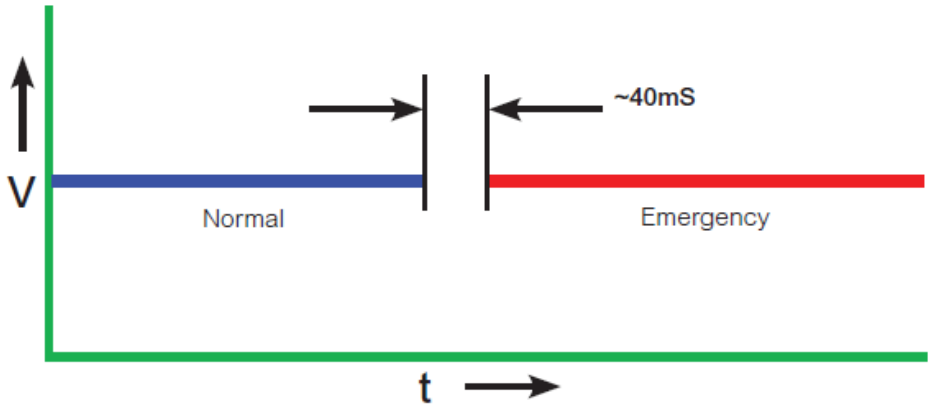




Open Transition (Break Before Make)

Open Transition is simple and cost-effective.

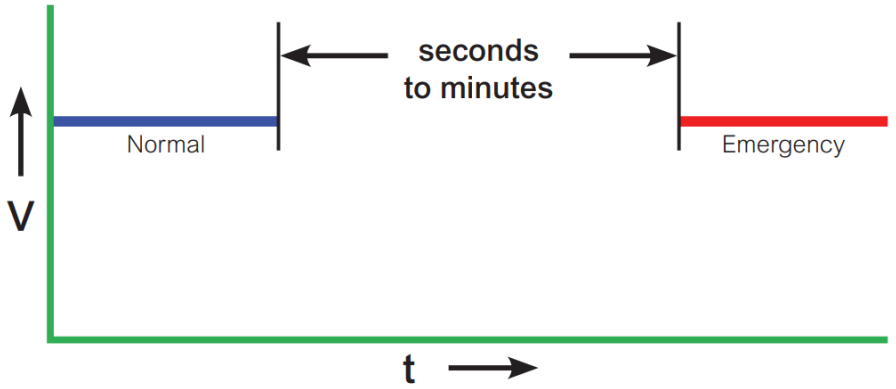
Open Transition is widely used across applications and industries.



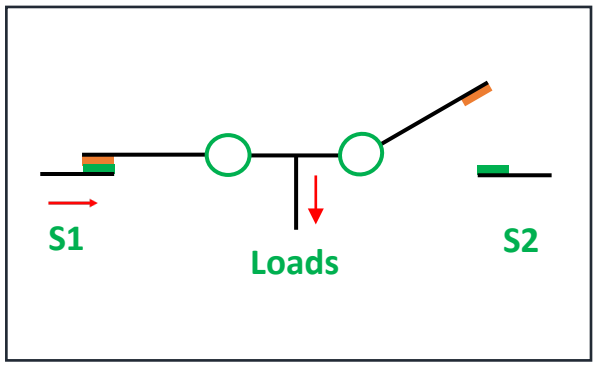
Delayed / Programmed Transition (Break-before-make)

- Provides extended duration of disconnect time before reconnecting.
- Disconnect period allows motor loads to wind down and transformers dissipate residual voltages.
- Only requirement is acceptable power on S2 and independent operators.

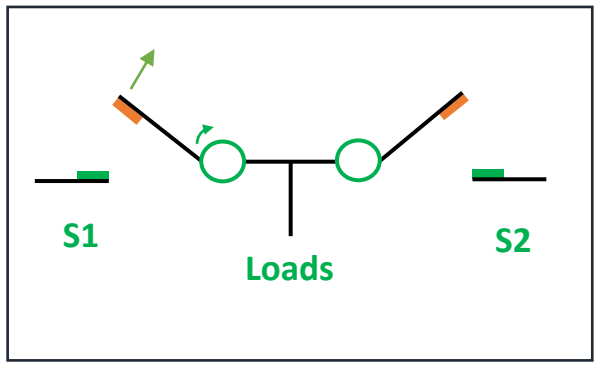
Load Status



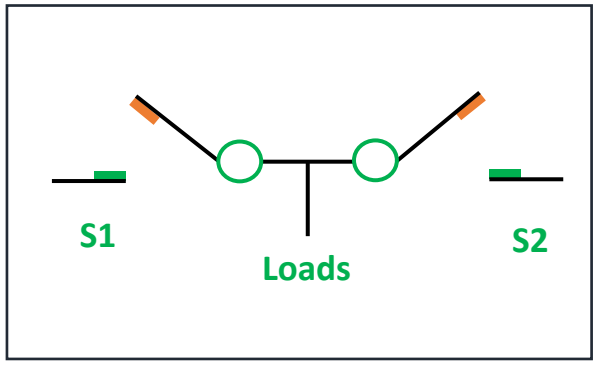
Before Transfer



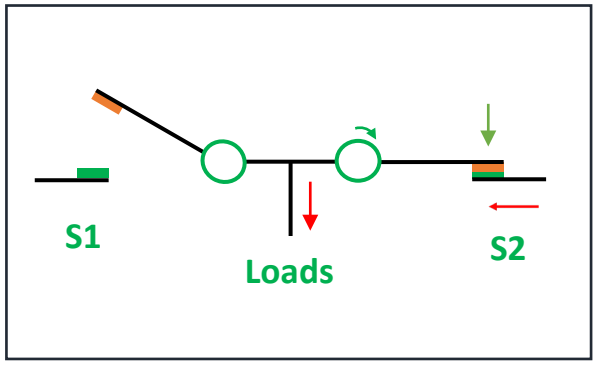
Disconnect S1



Wait…



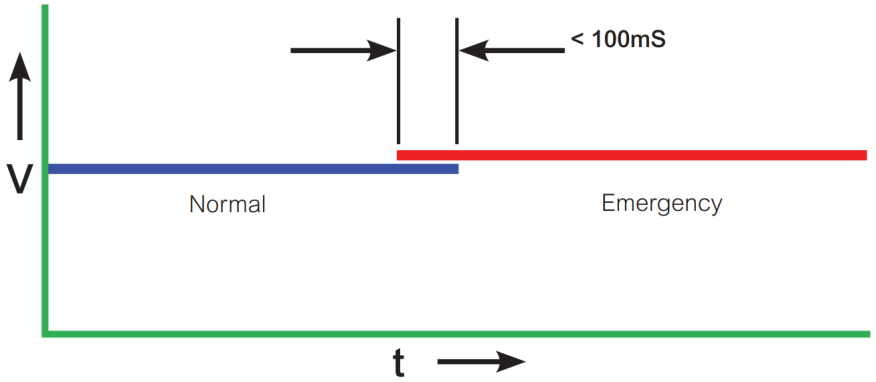
Connect S2



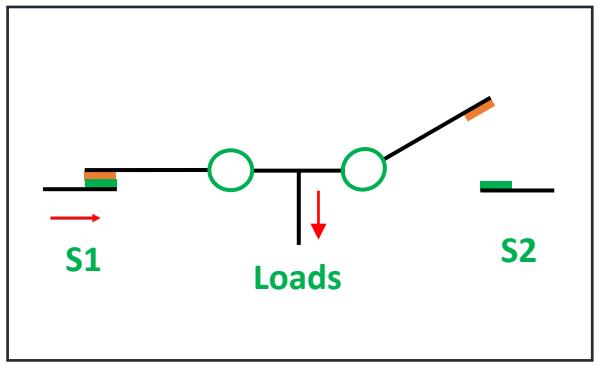
Closed Transition (Make-before-break) Less Than 100ms

- Provides momentary parallel connection to prevent any interruptions to loads.
- Convenient for periodic system testing or retransfer events with minimal load impact.

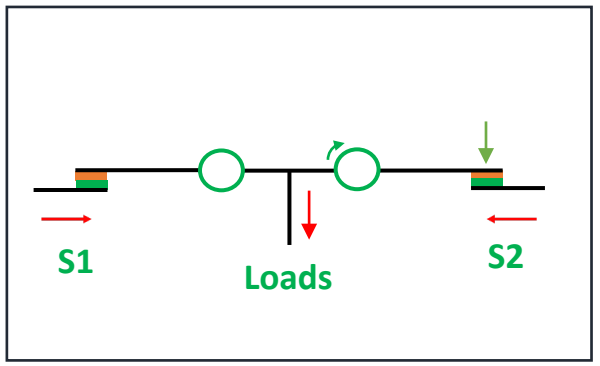
Load Status



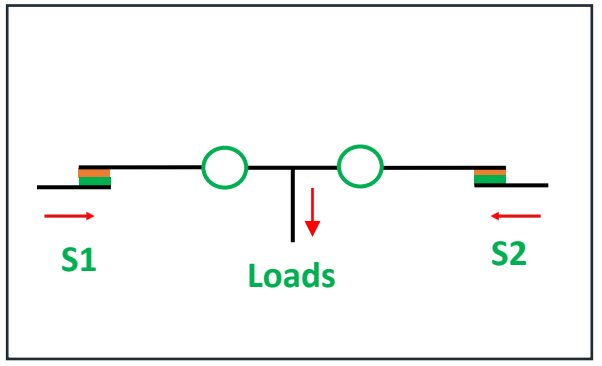
Before Transfer



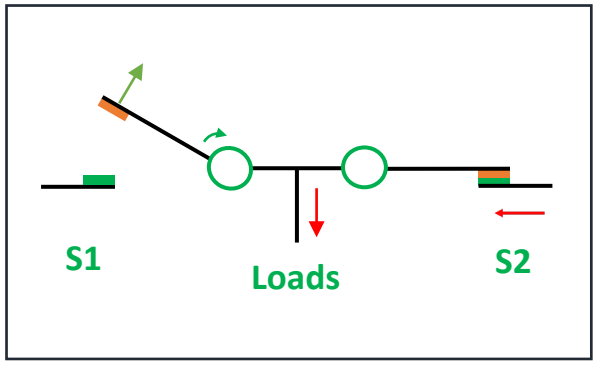
Connect S2



Parallel <100ms



Disconnect S1



Closed Transition

+/- 5 Electrical Degrees

Max .20 Hertz Frequency Difference

Voltage +/- 5%

ASCO Automatic Closed Transition Transfer Switches feature main contacts that overlap, permitting the transfer of electrical loads without power interruption. The switch transfers in a make-before-break mode if both sources are within acceptable parameters. Control logic continuously monitors source conditions and automatically determines whether the load transfer should be open (conventional non-overlap mode) or closed transition.

- Available 150 through 4000 amps
- Utilizes reliable, field proven solenoid operating mechanism
- Closed Transition Transfer is achieved passively within 5 electrical degrees, without control of engine generator set
- Additional control wiring not required
- Overlap time is less than 100 milliseconds (consult your local utility on protective relay requirements)
- Failure to synchronize and extended parallel time indication.

Transfer Switch Configurations

Automatic Transfer Switches use Differing Configurations

ATS Bypass

ATS Service Entrance

7000 Series Critical Power Engineered to Order Product

300 Series Industrial Pre-Engineered Feature Solutions

Transfer Switch Product Lines

7000 SERIES

Custom engineered for healthcare, data center, and mission critical facilities. They are the industry leading technology for the widest range of applications.

- Hospitals
- Data Centers
- Mission Critical Facilities

4000 SERIES

Sophisticated control for large commercial and industrial loads. 4000 SERIES switches have premium features in a configured-to-order solution.

- Large Commercial Applications
- Large Industrial Facilities
- Water Treatment Plants

SERIES 300

Standard designs for commercial and light industrial facilities that are simple to procure, install and commission.

- Outpatient Healthcare Facilities
- Small & Midsize Businesses
- Light Industrial Applications
- Integrated & Stand-Alone Quick Connects

SERIES 185

Economical designs for homes and small businesses.

- Small Businesses
- Residential Applications

Transfer Switch Product Comparison

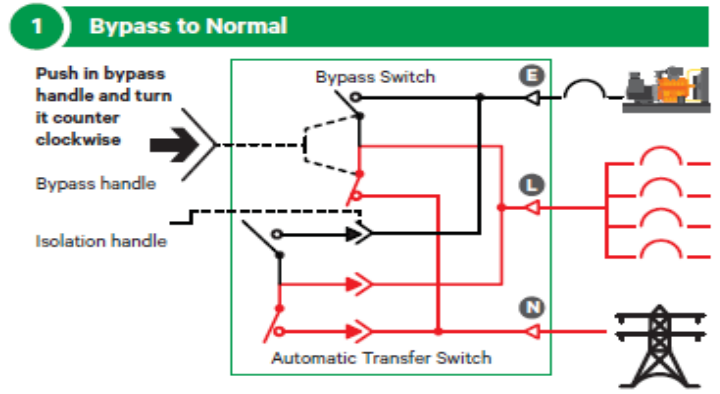
	ATS Product SERIES			
				
Comparison Features	**185**	**300 Group G**	**4000**	**7000**
Intended Application	Residential Light Commercial	Commercial Light Industrial	Industrial	Mission Critical Critical Power
Ampere sizes available	100 - 400	30 - 3,000	30 - 4,000	30 - 4,000
Phases Available	Single	Single or Three	Single or Three	Single or Three
Pole Counts Available	2	2, 3 or 4	2, 3 or 4	2, 3 or 4
Low Voltage	220 - 240V	115 - 600V	115 - 600V	115 - 600V
Medium Voltage	N/A	N/A	N/A	5kV, 15kV
Product Type				
Open Transition Transfer Switch	Yes	Yes	Yes	Yes
Service Entrance Rated Transfer Switch	Yes	Yes	N/A	Yes
Power Transfer Load Center	Yes	N/A	N/A	Yes
Closed-Transition Transfer Switch	N/A	N/A	Yes	Yes
Delayed-Transition Transfer Switch	N/A	Yes	Yes	Yes
Soft Load Transfer	N/A	N/A	N/A	Yes
Bypass-Isolation Transfer Switch	N/A	N/A	N/A	Yes
Closed-Transition Bypass-Isolation TS	N/A	N/A	N/A	Yes
Delayed-Transition Bypass-Isolation TS	N/A	N/A	N/A	Yes
Soft Load Bypass-Isolation TS	N/A	N/A	N/A	Yes
Withstand and Close-On Ratings				
WCR When Used With Any Circuit Breakers	N/A	N/A	10-100 kA	10-100 kA
WCR When Used With Specific Circuit Breakers	10kA -35kA	22-100kA	22-100kA	22-100kA
WCR when used with current limiting fuses	100-200kA	100-200kA	100-200kA	100-200kA
Short Time Withstand Rating	N/A	N/A	36-65kA	36-65kA
Neutral Configuration				
Solid	STD	STD	Yes	Yes
Switched	N/A	Yes	Yes	Yes
Overlapping	N/A	N/A	N/A	Yes
Ground Termination	Yes	Yes	Yes	Yes

Transfer Switch Product Comparison

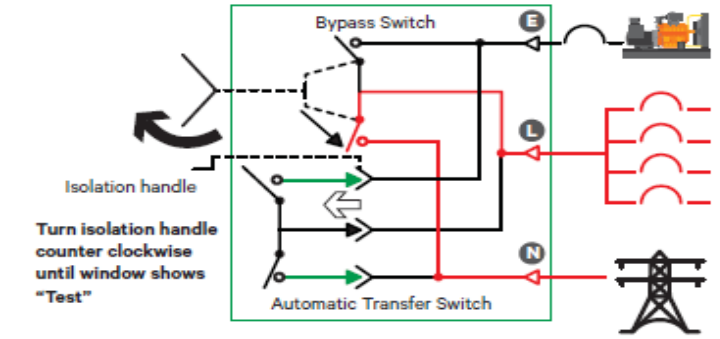
	ATS Product SERIES			
Comparison Features	**185**	**300 Group G**	**4000**	**7000**
Voltage and Frequency Settings				
Phase Selection	Single Phase	Single or Three Phase	Single or Three Phase	Single or Three Phase
Pick up Normal Source Voltage	198 Volts	85 to 100%	85 to 100%	85 to 100%
Drop out Normal Source Voltage	154-187 Volts	70% to 98%	70% to 98%	70% to 98%
Pick up Emergency Source Voltage	198 Volts	85 to 100%	85 to 100%	85 to 100%
Drop out Emergency Source Voltage	165 Volts	70% to 98%	70% to 98%	70% to 98%
Frequency	50 or 60Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Pick Up Emergency Source Frequency	48 or 57Hz	95% Fixed	90 to 100%	90 to 100%
Drop out Emergency Source Frequency	43 or 51Hz	85% Fixed	85 to 98%	85 to 98%
Normal Overvoltage Trip	N/A	102 to 115%	102 to 115%	102 to 115%
Emergency Overvoltage Trip	N/A	102 to 115%	102 to 115%	102 to 115%
Normal Overfrequency Trip	N/A	101 to 110%	101 to 110%	101 to 110%
Emergency Overfrequency Trip	N/A	101 to 110%	101 to 110%	101 to 110%
Pick up Normal Source Frequency	N/A	86 to 100%	90 to 100%	90 to 100%
Drop out Normal Source Frequency	N/A	85 to 98%	85 to 98%	85 to 98%
Normal & Emergency Voltage Unbalance	N/A	N/A	Yes	Yes
Time Delay Settings				
Override Normal Source Momentary Outage	1 or 3 Seconds	0 to 6 Seconds	0 to 6 Seconds	0 to 6 Seconds
Transfer to Emergency	10 Seconds	0 to 60 Min 59 Sec	0 to 60 Minutes	0 to 60 Minutes
Re-transfer to Normal Utility Power Loss Mode	5 Minutes	0 to 60 Min 59 Sec	0 to 60 Minutes	0 to 60 Minutes
Engine Cool Down	2 or 5 Minutes	0 to 60 Min 59 Sec	0 to 60 Minutes	0 to 60 Minutes
Override Emergency Source Momentary Outage	4 Seconds	0 to 6 Seconds	0 to 60 Minutes	0 to 60 Minutes
Generator Exerciser	7 Day	7 Day	Programmable	Programmable
Indication and Controls				
Load Connected to Normal	Yes	Yes	Yes	Yes
Load Connected to Emergency	Yes	Yes	Yes	Yes
Normal Source Available	Yes	Yes	Yes	Yes
Emergency Source Available	Yes	Yes	Yes	Yes
Transfer Test Switch	Yes	Yes	Yes	Yes
Terminals For Remote Transfer Control	STD	STD	STD	STD
Bypass Time Delay Switch	Yes	Yes	Yes	Yes
Transfer Inhibit	N/A	Yes	Yes	Yes
In-Phase Monitor	N/A	Yes	Yes	Yes
Load Disconnect Contacts with Time Delay	N/A	STD	Optional	Optional
Event Log	N/A	Optional	Yes	Yes
Power Manager	N/A	Optional	Optional	Optional
Transfer Controls Lock Out	N/A	N/A	Yes	Optional
Enclosures				

7000 Series ATS Bypass Isolation Switch

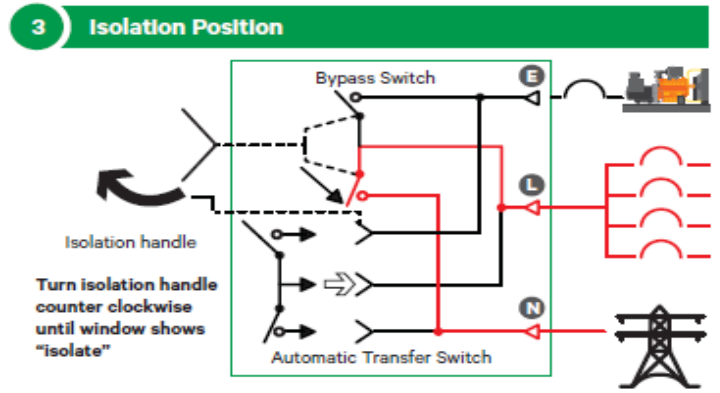
1 Bypass to Normal



2 Test Position

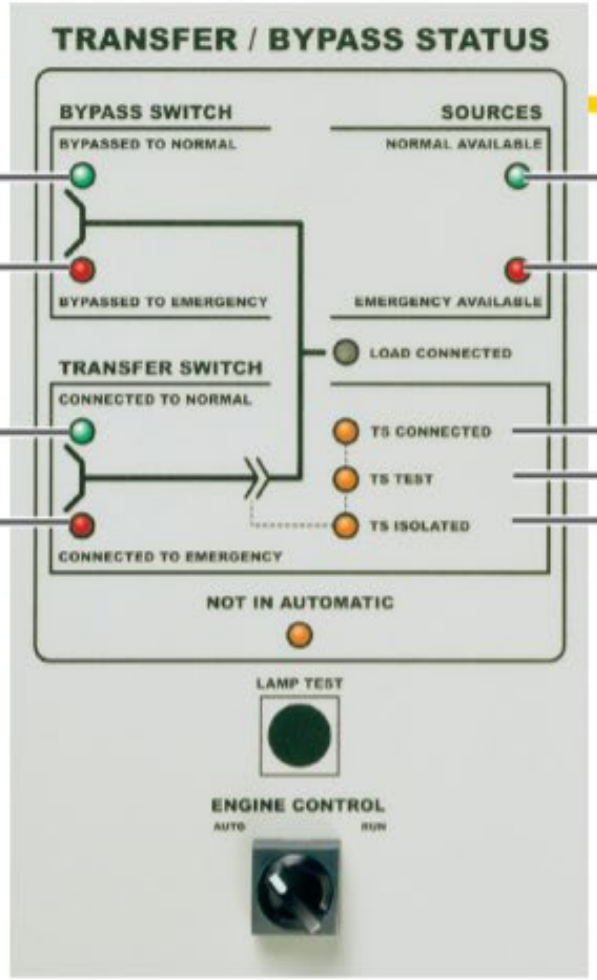


3 Isolation Position



ASCO 7000 SERIES Bypass-Isolation Transfer Switches

Transfer / Bypass Status Panel



Bypass switch position

Transfer switch position

Source availability

Isolation handle position

Instantly see the status of power availablility and switch positions.

Bypass Isolation Switch

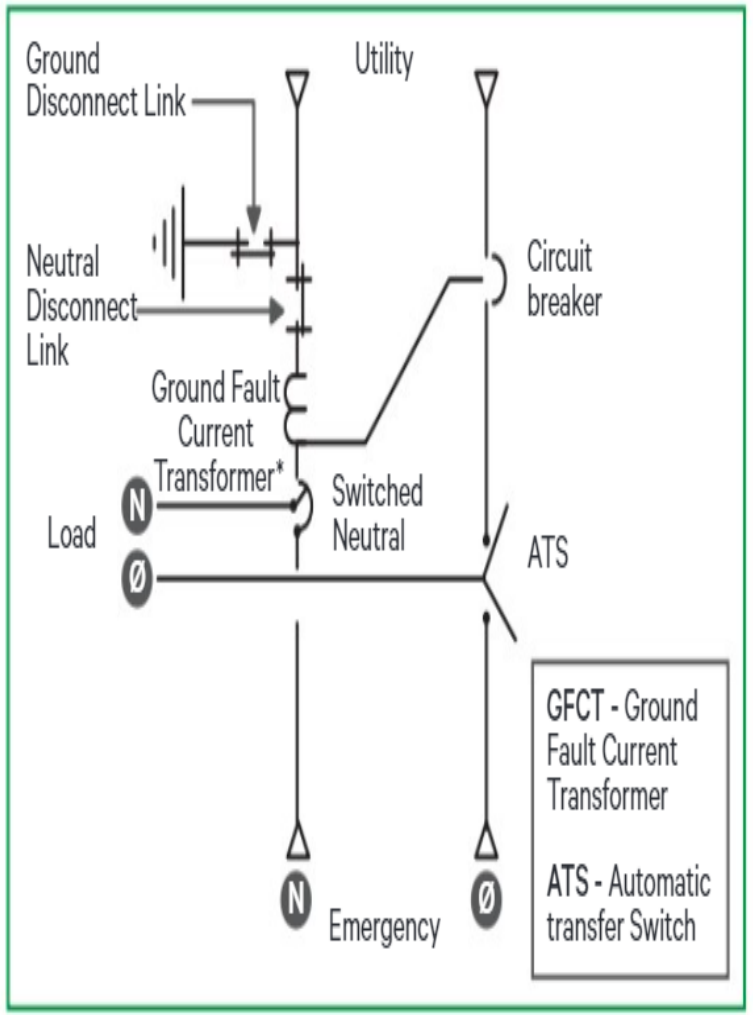
https://www.ascopower.com/staticresources/3facility/HTML-Healthcare/p4e.html

Service Entrance ATS

Product Features:

- Suitable for use as service entrance equipment.
- Sizes available from 70 - 3000 amps, 600 VAC, 50 or 60 Hz, single or three phase.
- 70 - 400 Ampere listed to UL 1008.
  600 - 3000 Ampere listed to UL 891.
- Automatic Transfer Switch is listed to UL 1008 for total system loads.
- Silver plated copper ground and neutral bus with solderless screw type terminals.
- Ground fault trip protection provided on sizes 1000 amps and above.
- Available with solid or switched neutral.

ASCO Series 300
SE Rated 800 amperes Type 1 enclosure



Service Entrance switches provide disconnect links for ground and neutral conductors.*Ground fault trip protection provided on models of 1000 amps and above

Service Entrance Rated Transfer Switches

Circuit Breaker Mounted In Separate Compartment For 250 – 4000 Amperes Can Be Operated Without Opening Enclosure Door

Ground And Neutral Disconnect Links

Questions to ask Service Entrance Rated ATS's

- Amps/Poles/ Voltage/Enclosure Type
- AIC rating of SE Rated ATS
- Service entrance breaker 80% or 100% rated
- 1000A + is ERMS required
- If emergency breaker is required does it need to be SE Rated

Medium Voltage Power Transfer Switches.

THE INNOVATION OF ASCO MEDIUM VOLTAGE POWER TRANSFER SWITCHES

ASCO 7000 Series 2000-3000 Amp Medium Voltage Power Transfer Switch

ASCO 7000 Series 1200 Amp Medium Voltage Power Transfer Switch

ASCO 7000 Series MEDIUM VOLTAGE POWER TRANSFER SWITCHES

Base Model Features		
Voltage	5 kV / 15 kV	5 kV / 15 kV
Breaker Ampacity	1200 A	2000 A / 3000 A
Number of Sections (Minimum)	2	3
Nominal NEMA 1 Dimensions		
Footprint (per section)	36"Wx92"D	36"Wx92"D
Height	95"H	95"H
UL 1008A	Yes	Yes
ANSI C37.20.2	Yes	Yes
Seismic Certification Upon Request	Yes	Yes
Insulated Bus	Yes	Yes
Cable Barriers	Yes	Yes
11 Gauge Steel (Exterior Surfaces) Draw-out Breakers	Yes	Yes
Draw-out Breakers	Yes	Yes
Automatic Shutters	Yes	Yes
Grounded Barriers	Yes	Yes
Baked Electrostatic Powder Paint	Yes	Yes
Distribution Available	Yes	Yes
Protective Relays Available	Yes	Yes
NEMA 3R Non-Walk in Available	Yes	Yes

Codes & Standards

- UL 1008A Listed – Standard For Medium Voltage Transfer Switches
- National Electric Code (ANSI/NFPA 70)
  - Article 517 – Health Care Facilities
  - Article 700 – Emergency Systems
  - Article 701 – Legally Required Standby Systems
  - Article 702 – Optional Standby Systems
  - Article 708 – Critical Operations Power Systems

Certifications

•Seismic Certification – available upon request at order entry

Arc Safety

Specifications pertaining to arc safety can include arc resistant construction and arc detection relays.

Transfer Switch Controller

The ASCO 7000 Series Transfer Control Center, providing refined and proven transfer control for low and medium voltage switches, leverages almost a century of power transfer innovation and application experience.

Transfer Switch Selection

1. Ampacity of ATS
2. # of poles 2-3-4
3. Voltage
4. Enclosure type
5. Service Entrance
6. Control Strategy Open/Delayed/ Closed
7. With or without Bypass Isolation
8. Features- Metering - Ethernet Card- Elevator Pre-signal
9. Remote Annunciator
10. WCR (AIC) rating from spec or drawings
    1. Drives ampacity of ATS

What's New

- MTS With Cam locks
- Quick Connects W Breakers
- 5701 Gateway
- 5101 Start Monitoring

Single Purpose Input and Output Quick Connect Panels (3QC)

•Features

- 400A – 4000A Type 3R Quick Connect Panels (3QC)
  - Rated up to 600V
  - Utilizes 16 series camlock receptacles for quick connections
  - Quick connect panels are constructed of aluminum, mild steel or Stainless Steel
  - Provides a convenient and reliable means of connecting to an alternate power source or load bank.
  - Together with an MTS and portable or backup generator, Meets article 700.3(F)
  - 10kA short circuit rating (400A-800A)
  - 22kA short circuit rating (1200A-1600A)
  - 100kA short circuit rating (2000A-4000A)

400-800A

1200-1600A

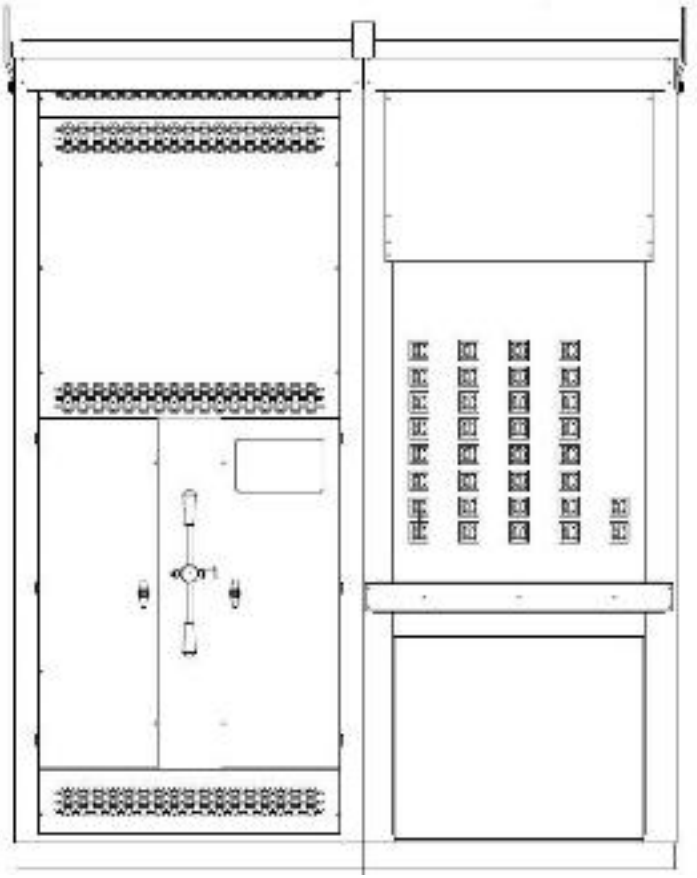
171QC Accessory (400A-1600A)

2000-4000A

Life Is On Schneider Electric

Manual Transfer Switch with Integrated Quick Connects

- Available from 150 to 3000 Amps, up to 600VAC, single or 3-phase.
- Provides a complete UL1008 listed solution in a single unit.
  - Larger amperage (1600A-3000A) MTQ listed under UL 891 (TS is UL 1008)
  - Service Entrance (MUQ) configurations are listed under UL 891 (TS is UL 1008)
- Standard Type 3R cabinet is weatherproof with or without temporary power cables connected
- Utilizes 16 Series camlock connectors



What's New!

- Two new versions of Dual Purpose QCPs.
- Provide a reliable, convenient, and economical way to connect a either a standby generator or Load Bank for testing.
- The previous QCP's were single purpose QCP's that only allowed connection to either a generator or Load Bank. These units were not interchangeable due to UL restrictions.

150A-800A Wall Mount Dual Purpose QCP with Disconnect Breaker between Sources

800A-2000A Pad Mount Dual Purpose QCP (No Breaker)

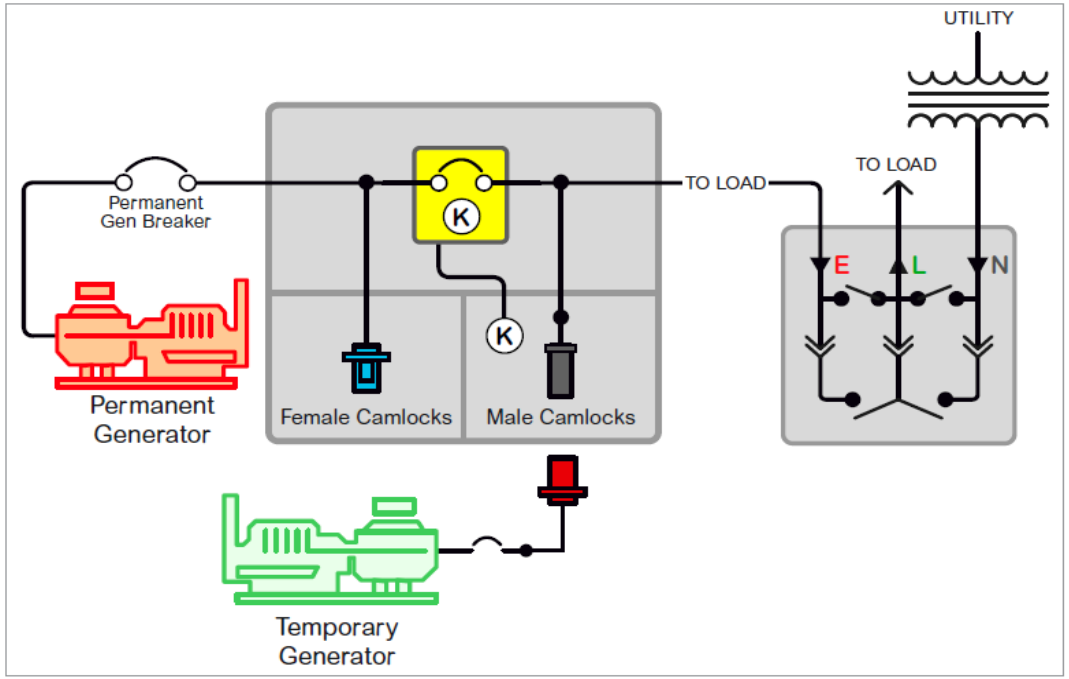
2400A-4000A Pad Mount Dual Purpose QCP (No Breaker)

Confidential Property of Schneider Electric

Dual Purpose QCP 150A-800A Wall Mount

Dual Purpose QCP with disconnect breaker

- Available from 150A-800A up to 600Vac
- ETL listed to UL 891 standards.
- 16 Series Connectors for load bank connection and portable generator connection.
- Integrated disconnect breaker and castell locking system allows for simultaneous usage of both input and output 16 series connectors.
- Kirk key mounted on door and second lock mounted on breaker.
  - Pad-lockable doors to prevent unauthorized entry
- Available in Type 3R and 3RX enclosures.
- Smart Lugs for portable generator connection.
- Accessory 172QC provides a 20A (battery charger) and 30A (block heater) receptacle

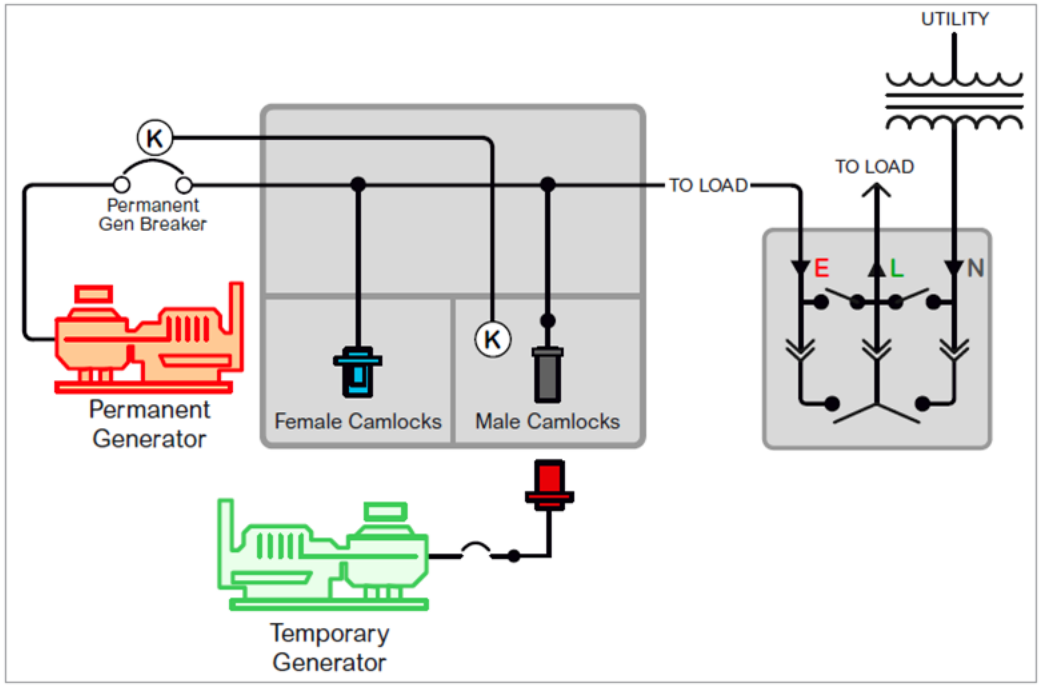


Confidential Property of Schneider Electric

Dual Purpose QCP 800A-4000A Pad Mount

Dual Purpose QCP without disconnect breaker

- Dual Purpose QCP – 16 Series Connectors for either load bank connection or portable generator connection. (not both)
- Available from 800A-4000A up to 600Vac
- ETL listed to UL 891 standards.
- No disconnect breaker- A kirk key or castell lock must be installed on the permanent generator breaker and lower door QCP to lock out either sources
- Kirk key mounted on door and second lock included to be mounted on Perm Gen Breaker
- Available in Type 3R and Type 3RX enclosures
- Accessory 172QC provides a 20A (battery charger) and 30A (block heater) receptacle



Confidential Property of Schneider Electric

ASCO 5701 8-Device Gateway

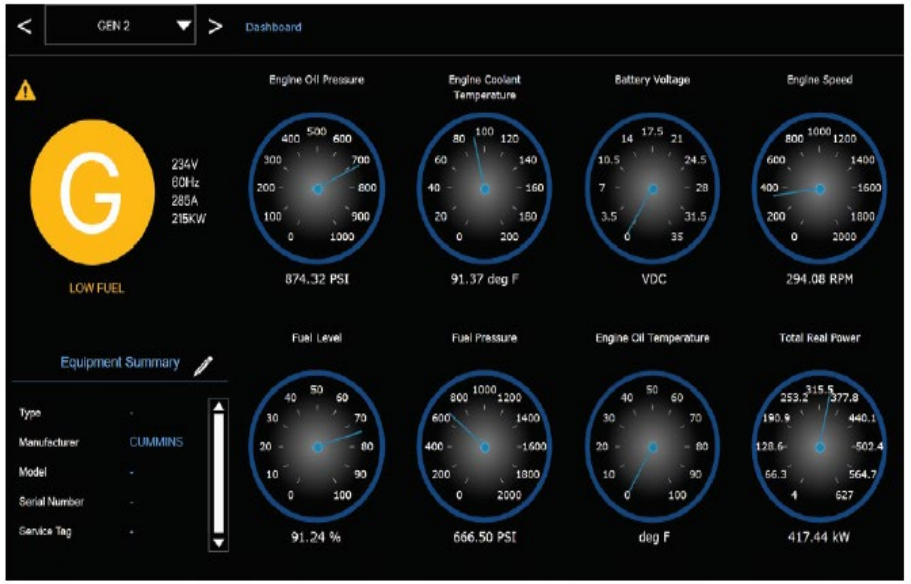
Compliance Reports NFPA, ATS and Gen Monitoring, BMS BacNet

The ASCO 5701 8-Device Gateway makes power management easy:

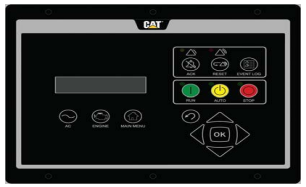
- Monitors and displays critical information from engine-generators, transfer switches, load banks, and surge protection systems.
- Provides for remote testing of power generators and transfer switches.
- Works with engine-generators from every major manufacturer including:
  - Caterpillar
  - Cummins
  - Generac
  - Kohler
  - MTU

Engine Performance Dashboard

- Presents information for each engine-generator
- Shows information about engine speed, oil pressure coolant temp, power output, fuel level, and more
- Displays status of utility and generator power and bypass transfer switches



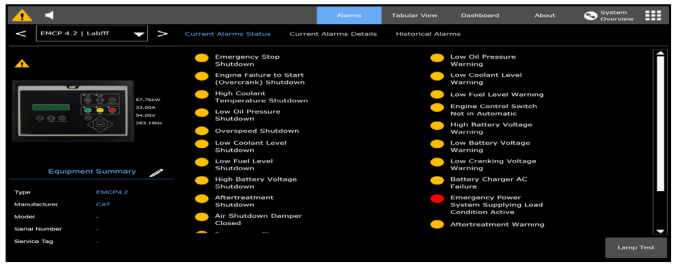
Direct Generator Monitoring and Reporting

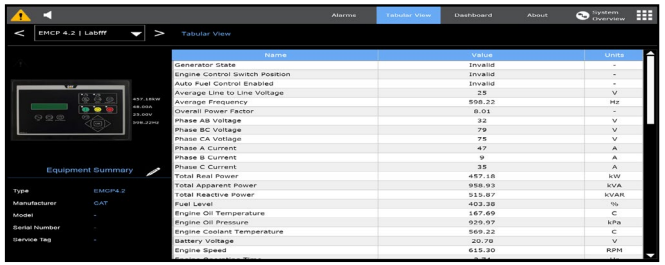


Caterpillar
EMCP 4.2

5212 PMU
(Hardwired)

- **Native** generator controller modbus **monitoring** and **reporting**
- NFPA 110 Compliance
  - **Safety Indicators** and **Shutdowns**
  - **Test and Outage Reports**
  - **Exhaust Temperature Reporting** if available

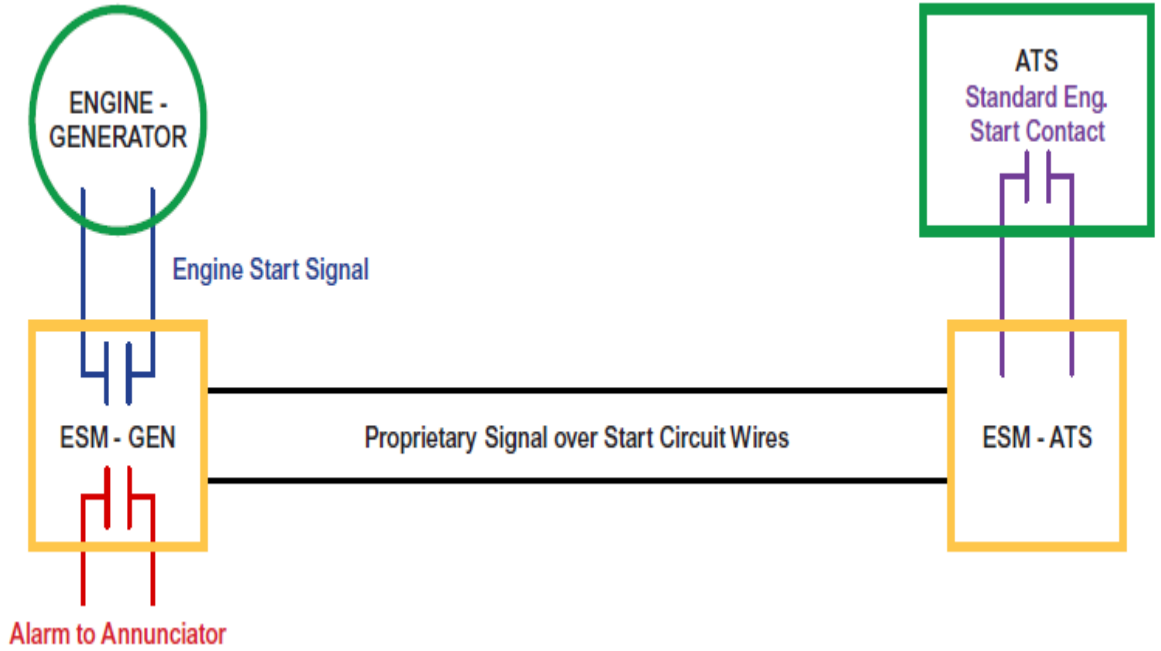




Monitoring the Integrity of Engine Start Signal Circuits

ASCO ENGINE START MONITORING SOLUTION

ASCO has developed a solution for complying with the 2017 NEC Engine Start Monitoring (ESM) requirement. ASCO's ESM solution consists of the *ASCO Model 5101 ATS Module* that installs within an ATS enclosure and the *ASCO Model 5101 Generator Module* that installs on an engine-generator. The modules are shown in Figure 6. Their placement in an engine start signal circuit is shown in Figure 7.



5101 Engine Start Monitoring 8 ATS's Per Module

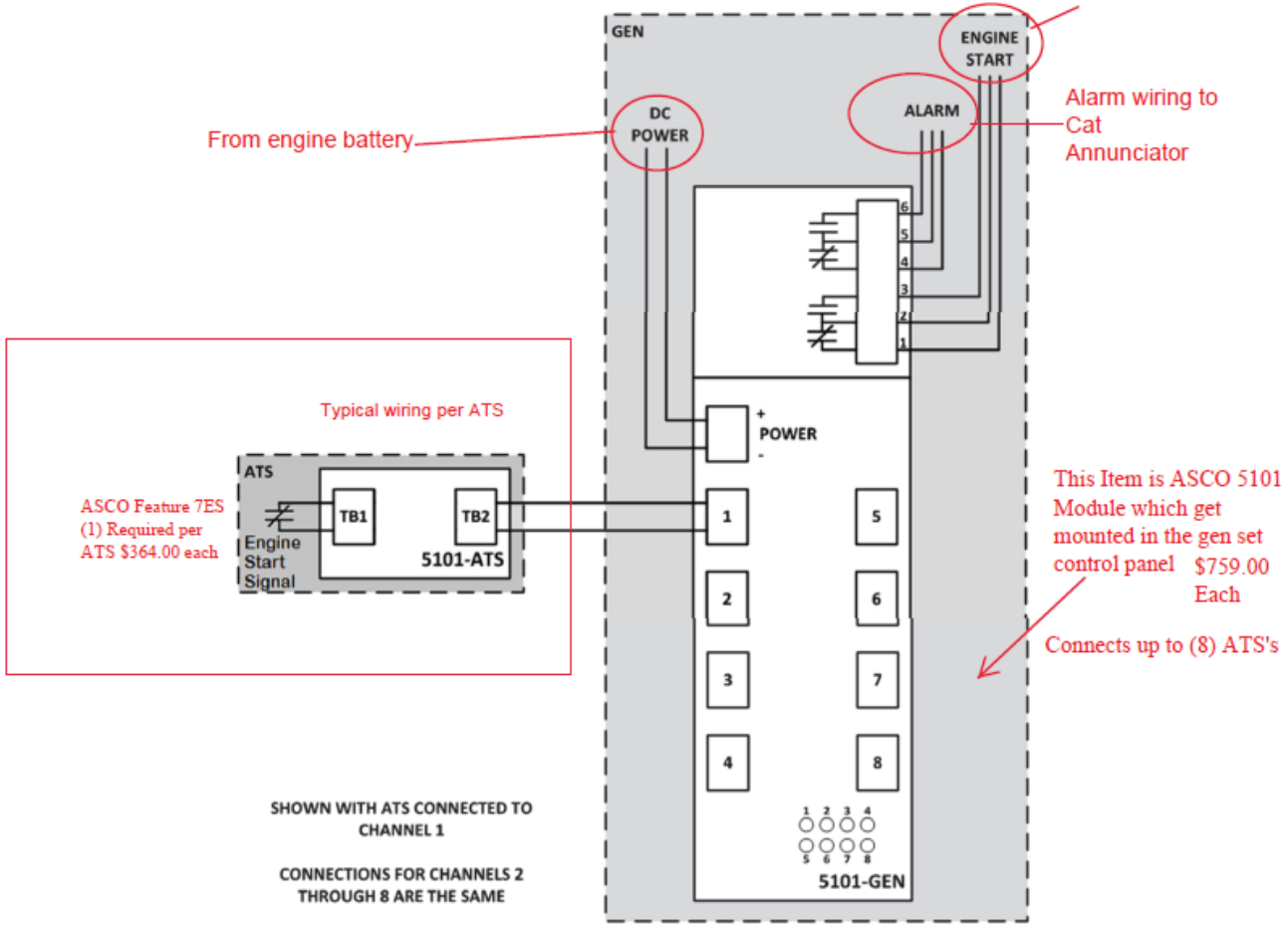
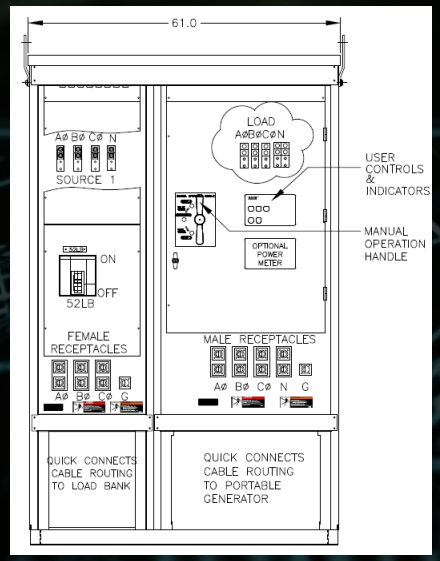


Figure 2. Installation Diagram

Coming Soon

Project Goldstar Wave 2: MTDQ & MGDQ Products



MTDQ – Dual Purpose Manual Transfer Switch with Quick Connects
MGDQ - Dual Purpose Manual Transfer Switch with Quick Connects with Gen Breaker

- Available from 150 to 3000 Amps, up to 600VAC, single or 3-phase.
- Disconnect Breaker and female camlocks tied to source 1 via feed thru lugs
- Auto start destination switch (standard)

Optional accessories

- 171 Accessory Package – Aux contacts and LED annunciation allows ASCO to meet 700.3 F 5 without additional hardware.
- Power Manager
- Communication via 72EE and IO module

Value Propositions

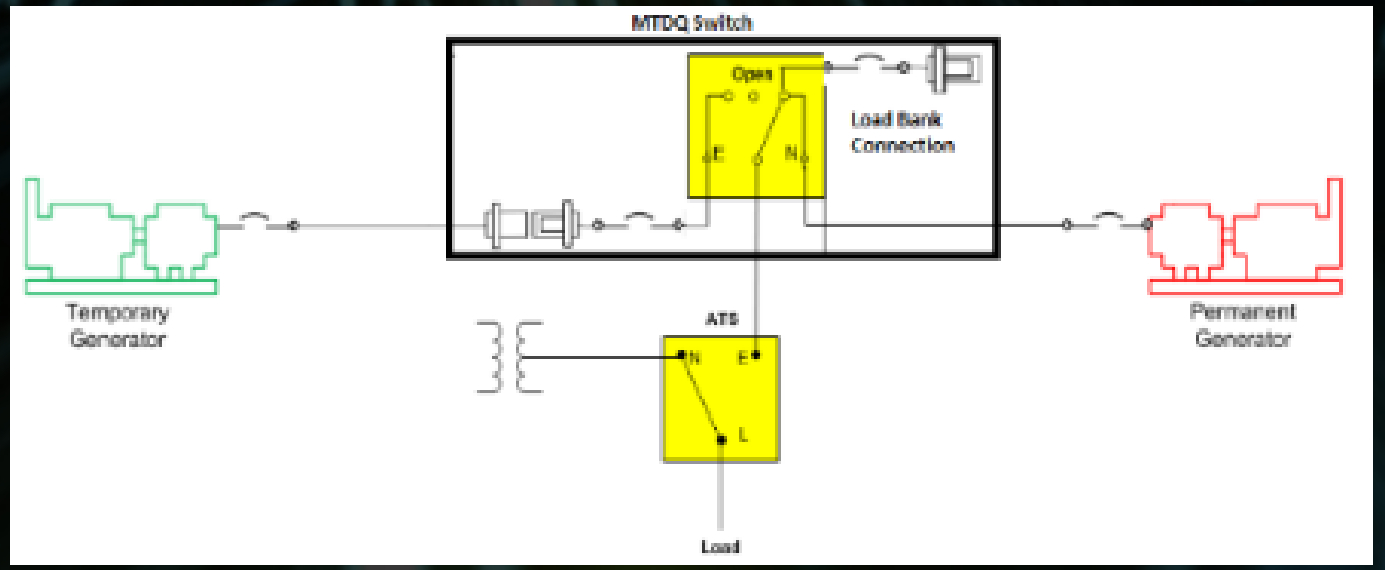
Power Intensive Applications

- Ability to handle the demands of motors and high inrush current
- Contacts operate at same speed as an ATS

Application Flexibility

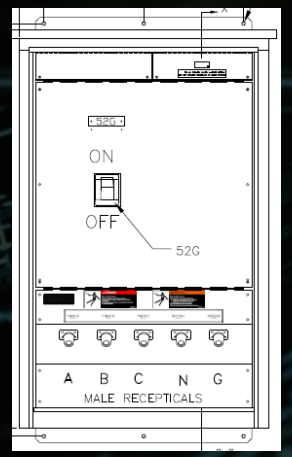
- Article 702 Compliance of Optional Standby Systems
- Article 700.3 F Compliance for emergency Systems

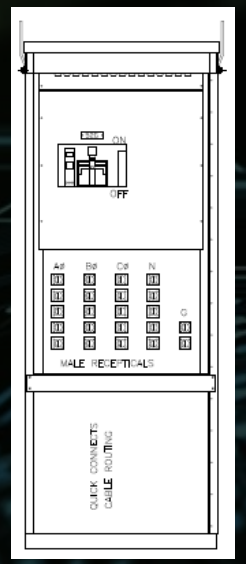
Planned Launch/Sell June 17



Coming soon

Project Wave 3: Quick Connect Panels with Integrated disconnect breaker





- Disconnect breaker provides protection from an oversize generator on an input panel.
- Shunt trip disconnect breaker provides allows for load dump in the event the emergency generator is brought online.
- Connection for either a portable generator or load bank.

Optional Accessory

- Accessory 171QC provides Phase Rotation Monitor, Engine Start Terminal post, Provisions for Kirk or Trap-Key Interlock (These features are standard on 2000A – 4000A units and all dual purpose QCPs)

Launch/Sell Date TBD

Value Propositions

When installed with an ASCO power transfer switch meets 700.3 F, you can be assured that your facility is protected by an economical solution that will reliably supply temporary power during a utility outage or maintenance work.